ANTHRAX EMERGENCY RESPONSE PLAN (AERP)

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Brett Elkin, Terry Armstrong, Troy Ellsworth

Department of Environment and Natural Resources
Government of the Northwest Territories

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SIGNED AT YELLOWKNIFE, NT THIS _____ day of _____, 2013.

Signed by, for and on behalf of the Government of the Northwest Territories

_____

Ernie Campbell,

Deputy Minister, Department of Environment and Natural Resources

DISCLAIMER

The Anthrax Emergency Response Plan is based on best available science and disease control principles. Although specific references are not provided for individual statements in the plan, additional technical information can be found in the Recommended Resource Material section.

ABSTRACT

Anthrax is a naturally occurring disease that is seen in several free-ranging populations of wood bison in northern Canada. The disease is endemic in northern bison, with periodic outbreaks that have killed at least 2,196 bison since the first confirmed outbreak in 1962. Between 1962 and 2012, there have been eight documented outbreaks in the Slave River Lowlands, ten in Wood Buffalo National Park (WBNP), and three in the Mackenzie herd. The disease can have a significant impact on wood bison populations, and is an important factor in conservation and management of this threatened species. The disease has been identified as an important threat in both the draft national Wood Bison Recovery Strategy and the NWT Wood Bison Management Strategy. Anthrax is a zoonotic disease, and is of potential concern to people who come in direct contact with affected bison or bison parts. Prompt response is very important if there is human contact, and people who may have been exposed to anthrax need to seek medical attention immediately.

Anthrax is an infectious disease caused by the bacterium *Bacillus anthracis*. Once introduced into an area, anthrax is maintained in the environment by resistant spores that may remain dormant in the soil for many years. Spores are more likely to persist in areas with ideal soil conditions (alkaline, calcium rich). Certain environmental and climatic conditions may trigger an anthrax outbreak. The exact nature of these predisposing conditions is not well understood, but a wet spring followed by a dry, hot summer appears to be one combination that may trigger anthrax outbreaks. In northern Canada, anthrax outbreaks in bison populations have occurred during the months of June, July and August. Infection occurs through ingestion or inhalation of spores, and generally results in sudden death. Anthrax primarily affects herbivores, and carnivores are relatively resistant. In northern Canada the disease affects primarily bison, though cases are seen occasionally in moose. Cases in other species have not been documented in the NWT. There is no practical treatment for anthrax in free-ranging wildlife, and disease control measures are targeted at reducing the environmental loading with anthrax spores in order to mitigate the size and severity of outbreaks.

Anthrax is a federally and territorially "reportable disease", requiring timely reporting and appropriate management after detection and diagnosis. The Department of Environment and Natural Resources (ENR) maintains a proven and effective Anthrax Emergency Response Plan (AERP) to ensure a rapid and effective response should an outbreak occur in bison populations managed by the Government of the Northwest Territories (GNWT). The overall objectives of the AERP are to reduce the size and impact of anthrax outbreaks in wood bison, and reduce the risk of public exposure. This plan covers all aspects of surveillance, testing, scavenger prevention, carcass treatment and human health protection, using an incident command system that emphasizes

worker and public safety. The Department conducts routine aerial anthrax surveillance flights each summer, supplemented by observations during other ENR fire and wildlife fieldwork. An enhanced surveillance program is implemented upon the detection of a suspected outbreak. Once confirmed, the AERP is implemented immediately, targeted at controlling the disease through disposal and decontamination of carcasses and contaminated sites. The AERP is continually reviewed and updated using the best available information and experience from previous outbreaks.

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INTRODUCTION

1.1 History of Anthrax in the Northwest Territories

It is not known when or how anthrax was first introduced into northern Canada. Historical information, traditional knowledge and anthrax phylogenetic research suggests that it may have been in bison in northern Canada for a long time, perhaps hundreds of years, before the first outbreak was confirmed in 1962. Ecological conditions in certain areas in the Slave River Lowlands, Wood Buffalo National Park (WBNP) and the Mackenzie bison range appear to favour the persistence of environmental contamination with spores and the subsequent occurrence of periodic explosive outbreaks. Anthrax is considered endemic in these northern bison populations, with periodic outbreaks that have killed at least 2,196 bison since the first confirmed outbreak. Between 1962 and 2012, there have been eight documented outbreaks in the Slave River Lowlands, ten in WBNP, and three in the Mackenzie bison herd (Appendices 1 and 2). Sero-epidemiological studies also suggest that there have been additional anthrax cases when outbreaks in these herds have gone undetected.

Although anthrax was retrospectively diagnosed in two wardens in 1952 after they handled a bison carcass in WBNP, the disease was not recognized in northern Canada until the summer of 1962 when a large-scale outbreak occurred in bison near Hook Lake (Appendix 1). A total of 281 bison carcasses were found between the end of July and the end of August of that year. In 1963, 15 bison deaths due to anthrax were identified in the Hook Lake area between the end of June and the middle of July. That summer, the outbreak also spread west of the Slave River to the Grand Detour area and the Park Central region of WBNP, where 242 and 47 dead bison were found, respectively, between the middle of July and the middle of August. Anthrax occurred again in July and August of 1964 in the Hook Lake, Grand Detour and Park Central areas, during which 44, 259 and 49 bison carcasses were found, respectively. During this outbreak, the disease also spread south across the Peace River to the Lake One area of WBNP where 11 carcasses were found. During the outbreaks in 1963 and 1964, anthrax was also diagnosed in several moose in the same general area.

During the summers of 1965 and 1966, there were no bison deaths attributed to anthrax. Partial or complete carcasses of 22 bison were found in WBNP over this period, but post-mortem and laboratory evaluations of these animals did not confirm the presence of *Bacillus anthracis*. While the negative results were inconclusive and did not exclude the possibility that some of these animals may have died of anthrax, the surveillance results suggested there were few, if any, bison deaths due to anthrax during this period.

In 1967, a major outbreak occurred within WBNP in the Lake One area. From the beginning of August until the beginning of September, 118 bison carcasses were found and two bison exhibiting signs of anthrax were s ıot. During that summer, anthrax was also diagnosed in cattle near Fort Vermillion, AB. In 1968, only one confirmed case of anthrax was recorded in the Park in a bison bull that died in the Lake One area.

Anthrax was next confirmed in 1971, when 33 cases were recorded in the Hook Lake area from mid-June to the beginning of July. Anthrax deaths either did not occur or went unnoticed from 1972 through 1977. In June and July of 1978, a total of 79 bison were confirmed to have died of anthrax with 12 carcasses found in the Hook Lake area, 27 in the Grand Detour area and 40 in the Park Central area.

Anthrax was not reported again until 1991 when an outbreak occurred in WBNP. From mid-July until mid-August, 32 carcasses were found in the Park Central area. Parks personnel feel that this number under-represents the total number of bison deaths resulting from anthrax, as many of the animals died in areas of dense vegetation cover (L. Comin pers. com.). That same summer, several anthrax outbreaks in cattle were observed on farms in western AB.

Anthrax was detected for the first time among bison in the Mackenzie Bison Sanctuary (MBS) in mid- to late July 1993. The outbreak lasted until about mid-August, coinciding with the arrival of cooler weather. Anthrax was confirmed in samples collected from dead bison and a moose. One hundred and sixty nine dead bison were found; 78% of them were mature bulls. Three moose and one black bear were also found dead, though anthrax was not confirmed in these species.

Anthrax occurred again in WBNP in 2000 beginning in the Davidson Tower area and then moving into the Lake One area. Between mid-July and mid-August, 52 and 48 bison carcasses were found in the Davidson Tower and Lake One areas, respectively. Three moose carcasses were discovered in the affected area, with a positive confirmation of anthrax as the cause of death. Three black bears were also found dead and while *B. anthracis* spores were recovered from the digestive tracts of two of the bears scavenging of infected carcasses, the microbe was not isolated from other body tissues and its role in their deaths cannot be confirmed. The disease reoccurred in the Lake One area in the summer of 2001, where between the end of June and the end of July, 92 bison carcasses and one moose carcass were discovered. During the same year, a small outbreak was detected in the Hook Lake region with 12 bison carcasses found. The animals were estimated to have died during the second half of July.

Anthrax was again observed in the Hook Lake area in 2006. From mid-June until the first week of July, 26 bison carcasses were found and incinerated. The onset of this

outbreak in late June was unusually early, and likely related to an early spring with extended periods of hot weather in June. The carcasses of two bison calves were also found during the outbreak but they were believed to have been wolf kills. Seven bison cows died of the disease and it is possible that wolves killed the calves after their dams had succumbed to the disease. Another outbreak occurred in the Hook Lake area in 2010, starting on June 23 and killing a total of 45 bison and one moose. The same year, seven cases of anthrax in bison were also detected in WBNP.

A second documented outbreak of anthrax occurred in the Mackenzie bison herd in mid-August, 2010. A total of nine cases were found in a relatively discrete area near Mills Lake, geographically remote from the last documented outbreak in the Mackenzie herd in 2003 and in a very different and wetter environment than seen in other outbreaks in wood bison. In 2012, the third documented outbreak of anthrax occurred in the Mackenzie bison herd, killing at least 440 bison across the herd's range. Several major clusters of cases were found at Mills Lake, Mink Lake, the Horn Plateau, the Falaise Lake area, and along the highway from the Mackenzie River to Behchokǫ. A total of six moose carcasses were found during the outbreak and anthrax was confirmed in samples from three of these.

1.2 Epidemiology of Anthrax

Anthrax is an infectious disease caused by the bacterium *Bacillus anthracis*. The disease occurs worldwide in a wide variety of mammals. Herbivore species are most susceptible to the disease, with carnivores more resistant to infection and disease. In the NWT, anthrax outbreaks primarily affect free-ranging bison, though occasional cases are seen in moose. Once introduced into an area, the anthrax organism can maintain itself in the environment in a resting or spore stage.

Development into the active or vegetative form does not occur until the spores are introduced into a mammalian body either by ingestion, inhalation or inoculation. Once in the body, the spore germinates within lymph nodes, and the vegetative stage of the bacteria multiplies rapidly producing a blood-borne infection. The bacteria produce a toxin that can kill large herbivores rapidly, often within a few days. After the animal dies, the bacteria can be released back into the environment through discharges from body orifices, leaking from breaks in the skin of bloated animals, or when the carcass is opened by scavengers. Blood from infected animals can contain $>1x10^8$ anthrax organisms per ml of blood at the time of death, and is a major source of spores for the environment. If the active vegetative form of the bacteria is released from the body, environmental conditions lead to the formation of resistant spores that will subsequently contaminate the surrounding environment.

Anthrax spores are extremely resistant to normal environmental conditions. Spore survival within the environment is related to the activity of normal soil bacteria as well as to the type and pH of the soil. Spore survival is enhanced in alkaline, calcium rich soils. Local ecological conditions in certain areas within the bison ranges in the Slave River Lowlands, WBNP and Mackenzie herd appear to favour the persistence of anthrax spores. Spores may remain viable for many years in soil, or on hides, hair, bone and other animal matter.

The occurrence of anthrax cases is influenced by climatic and ecological conditions that determine soil moisture, surface temperature, plant growth, surface water, and evaporation. However, it isn't exactly clear or predictable how these conditions influence the microbe, the herbivore host and the environment to precipitate an outbreak. Rainy periods followed by hot dry weather have been thought to favour the occurrence of the disease, which often follows flooding and periodic inundations of low-lying lands. It is hypothesized that movement of soil or water may physically bring the dormant anthrax spores to a position of accessibility at the soil surface. Outbreaks in bison often occur in summers when the weather is hot and dry, and these weather conditions may affect exposure to anthrax through their effects on behavioural or feeding activity of bison. During this time, bison may be grazing closer to the soil and ingest contaminated soil along with vegetation. Almost all of the cases of anthrax in northern Canada have occurred in the months of June, July and August.

Anthrax can be viewed as an environmental, soil-borne disease that periodically infects an animal host, where it undergoes significant replication in numbers of bacterial organisms before being released back into the environment. The disease is not spread directly from bison to bison (or other animals), but is picked up from the environment. Bison may either ingest the anthrax spores by consuming soil along with vegetation or drinking contaminated water, or they may inhale aerosolized spores while wallowing, dust-bathing or pawing at dried soil. How and where bison pick up the spores during each outbreak can be difficult to determine. Significant soil and environmental contamination occurs locally at the site of previous bison carcasses that have died of anthrax, providing a source of infection. The distribution of spores tends to occur immediately around the carcass, and in the top layers of the soil (<10 cm). Bison that wallow on contaminated soil may potentially carry anthrax spores on their hides from one site to another. Environmental testing has not found any significant amount of spores in most areas of the environment other than at previous carcass sites.

Mammalian scavengers, such as wolves, foxes and bears, contribute to the spread of the disease by opening carcasses, which facilitates release of the bacteria and local contamination with spores. Avian scavengers are also common, and contribute to local contamination by opening up the carcass. Scavengers may also spread spores beyond

the carcass site by moving body parts away from the site, transporting spores in their digestive tracts after feeding on a carcass, or by transporting spores on their fur/feather/other body parts. Avian carrion eaters have been implicated in spreading the disease over considerable distances; while the presence of viable spores have been confirmed in the gastrointestinal tracts of some birds, their role in transmitting the organism over long distances has not been confirmed. During anthrax outbreaks in northern Canada, viable anthrax spores have been recovered from the digestive tract of ravens, herring gulls and black bears, and from the feces of foxes and wolves. Carnivores and omnivores are much more resistant to anthrax than herbivores and despite consuming large quantities of infected meat during outbreaks, few, if any, scavengers die of the disease.

A number of biting insects, including tabanids (horse flies) and mosquitoes, have been implicated as a possible route of transmission of anthrax, though their potential role in the spread of the disease in bison is unknown. It should be noted that insect transmission of anthrax to humans is considered a very rare occurrence and there have been very few documented cases in the scientific literature of anthrax by insect bite. In Africa, some non-biting insects such as blow flies have been demonstrated to carry spore contaminated fluids from infected carcasses to surrounding vegetation which is then consumed by browsing herbivores leading to further cases of the disease.

The history of the disease in bison in northern Canada suggests that mature animals are much more susceptible than the young, and the majority of carcasses detected in many outbreaks are adult males. This has also been observed in outbreaks in other species, and may be the result of differences in male social, breeding, dominance or feeding behaviour, habitat use, body condition, or other gender differences. However, in some large outbreaks (including the 2001 WBNP and 2012 Mackenzie outbreaks) the documented cases were more evenly distributed in both adult males and females, with some younger animals affected.

The epidemiology of anthrax in northern Canada is not completely understood, and is the subject of ongoing scheduled and opportunistic research by the Government of the Northwest Territories (GNWT), Department of Environment, and Natural Resources (ENR) in order to better understand, predict and manage anthrax outbreaks.

1.3 Symptoms of Anthrax

In herbivores, anthrax is an infectious, febrile disease characterized by a sudden onset and rapidly fatal course. The incubation period may vary from hours to days. The disease can occur in a very acute form, in which an apparently healthy animal will develop a rapidly progressive septicaemia (blood infection), toxin production and

sudden death with no obvious clinical signs. In goats, research has shown that the bacteremia occurs 5-8 hours before death. Anthrax can also occur in an acute form that will last for several days before the animal dies, during which the animal may show some clinical signs.

Not all bison that are exposed to anthrax spores in the environment will become infected, sick or die. The median lethal dose (LD_{50}) is the average number of spores required to cause an infection. The LD_{50} can vary by host species, immune status of the host, virulence of the anthrax strain, route of infection (ingestion, inhalation or inoculation), and other host, pathogen and environmental factors. There are also species differences in susceptibility to the toxin. While the LD_{50} is not known for bison, they are thought to be relatively sensitive to infection. Serological studies in bison after and between anthrax outbreaks has shown high antibody titres to the anthrax toxin, suggesting some animals are exposed but do not die.

Bison with anthrax may exhibit a number of the following signs, although these symptoms can also be caused by other conditions and are not diagnostic on their own. Infected bison may appear depressed or unresponsive to stimuli. They may not eat and stop ruminating, or they may feed voraciously. Walking may be difficult, and they may appear lame or have a stiff-legged gait. Infected bison may be nonresponsive and reluctant to rise when approached by a person, vehicle or aircraft. The animal may discharge white or bloody foam from the nostrils, and subcutaneous swellings are common in various parts of the body.

In animals that have died of anthrax, decomposition of the body occurs very rapidly, and rigor mortis is absent or incomplete. The carcass bloats quickly, and bison tend to be found on their back or sides with their legs splayed. The blood is darker than normal and will not clot readily. Haemorrhages are common throughout the body, and light coloured skin may appear bluish in colour. Dark blood or blood-stained fluid may ooze from body openings. The presence of swellings on various parts of the body is common, often associated with subcutaneous edema (excessive accumulation of fluid below the skin). The edema can also cause the cape hair of the animal to fall out in large clumps. A number of internal changes occur including an enlarged spleen. Any animal suspected to have died from anthrax should not be handled and should never be opened.

1.4 Anthrax Management and Control Measures

Anthrax is endemic in the Slave River Lowlands, WBNP and Mackenzie bison herd ranges, and future cases or outbreaks are likely to occur. Anthrax is a concern from

both a human safety and a bison management perspective, and ENR's approach to dealing with anthrax is based on two main goals:

- Minimizing impacts of anthrax on bison conservation and management, and
- Protection of human health.

Anthrax management and control measures in bison are targeted at limiting the amount of environmental contamination with anthrax spores, and reducing the total number of spores available to cause future cases or outbreaks. Anthrax is an environmental disease, with spores located in areas with suitable soil conditions for spore persistence (alkaline, calcium rich). Spores have a long but finite life span, and require new animal cases in order for the bacteria to multiply and maintain a constant environmental pool of spores. If the number of new spores entering the environment is reduced (by finding and treating cases) below the natural loss of anthrax spores (spore death or movement out of bison habitat), the total number of spores in the environment available for future cases will decrease over time. Ultimately, if carcass detection and treatment effectiveness is high enough, a goal of eliminating the disease from the environment may be possible.

A major component of anthrax management is targeted surveillance of bison herds to rapidly detect any anthrax mortalities or outbreaks, particularly in areas where previous outbreaks have occurred. ENR conducts routine anthrax surveillance flights over the Slave River Lowlands and Mackenzie bison herd range each summer. When an anthrax outbreak occurs, surveillance is enhanced, using a combination of fixed-wing and rotary aircraft, ground searches and thermal imaging systems in wooded areas where visibility from an aircraft is limited. During the 1993 MBS outbreak, a helicopter-mounted infra-red thermal imaging system was very effective in locating carcasses in heavily wooded areas where carcasses could not be seen from the air.

Control measures are directed at the detection and prompt disposal of anthrax carcasses to minimize scavenging, contamination of the environment with spores, and potential human exposure.

During anthrax outbreaks in the 1960s, the primary method of carcass disposal was deep burial in which carcasses were buried in 2 m deep pits and covered with a mound of soil. Lime was often used to treat the carcasses, but current information indicates this is not sporicidal and the alkaline, calcium rich nature may in fact support spore survival. This approach to carcass management likely did not destroy substantial numbers of anthrax spores, and may have maintained a reservoir of spores that could be unearthed at a future time. The burial mounds have been used as denning sites for foxes and other animals, with observations of tunnels in the mounds that has allowed

contaminated bones and soil to be brought to the surface. Natural erosion and soil movement has also occurred at these mounds, resulting in parts of old carcasses being exposed to the surface. Deep burial is no longer used or recommended as a carcass disposal technique by ENR.

The current protocol for the disposal of anthrax infected carcasses in the Slave River Lowlands and Mackenzie bison herd range is to incinerate all carcasses and surface soil immediately at each carcass site, with chemical disinfection of the area following cremation. Carcasses should be treated where they are found and not moved. Incineration has been shown through testing to be a highly effective means of anthrax spore destruction if done thoroughly. A combination of green wood, coal and dry wood placed both under and over the carcass has proven to be the most effective approach for spore reduction (Section 8.5.4). After the initial burn the site is revisited, and any remaining carcass material is re-burned. Following successful incineration of the carcass, the site where the animal lay is treated with formaldehyde, a chemical disinfectant that can kill any remaining anthrax spores.

During large outbreaks where incineration crews cannot keep up with the number of carcasses discovered, carcasses awaiting incineration may be either treated with a chemical disinfectant or covered with a staked tarp to prevent scavenging and release of spores. Application of 10% formaldehyde to the carcass surface and surrounding contaminated soil will provide superficial decontamination and make the carcass less palatable in order to reduce scavenging until the carcass can be incinerated.

Vaccination is an effective tool to prevent anthrax mortalities in livestock and captive wildlife, but mass vaccination is not practical in free-ranging populations. In a mass vaccination program, it has been estimated that at least 80% of the animals must be inoculated annually for the program to be effective. Immunization of free-ranging bison was conducted in WBNP between 1965 and 1977, and proved to be a very difficult and expensive task. While a large number of animals were vaccinated, the roundup and handling of bison resulted in the death of a significant number of animals. Bison at the Hanging Ice Bison Ranch[1] north of Fort Smith were vaccinated during the outbreak in 1991. Vaccination of ranched bison is practical and has been incorporated as part of routine annual handling procedures. Other disease control measures such as buffer zones or population reduction have been tried in the past, but were ineffective in controlling the disease.

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[1]Hanging Ice Bison ranch: privately held commercial bison ranch location north of Fort Smith, NWT.

1.5 Human Health Implications

Anthrax is a zoonotic disease (one that can be transmitted from animals to humans), although human cases in North America are rare. Risk of exposure to the diseases is most likely to occur through direct contact with infected animals, carcasses or animal parts (e.g. meat, hide, hair, etc.). Several forms of anthrax are recognized in humans depending on the route of entry of the spores.

Cutaneous anthrax is by far the most common form and accounts for 95-99% of human cases worldwide. The spores gain entry via small cuts, skin abrasions, or rarely through insect bites. A few days after exposure, the affected site begins to itch and a dark pustule forms. The pustule continues to fill with fluid and eventually ruptures developing into a typical black anthrax eschar. Localized swelling, malaise and fever accompany the developing eschar. Cutaneous anthrax on the face or neck may be complicated with obstructive airway disease due to the associated edema (swelling). While some cases of cutaneous anthrax may resolve with time, infection can progress to a severe and life-threating systemic disease. Cutaneous anthrax is readily treatable with antibiotics if medical attention is sought in a timely fashion.

Gastrointestinal anthrax results from the ingestion of spores in contaminated meat or body parts from animals that have died of anthrax. Gastrointestinal anthrax can cause severe systemic disease, with symptoms that can include nausea, vomiting, anorexia, fever, abdominal pain and occasionally bloody diarrhea. The disease may progress to a generalized toxemia, shock and death in 25-50% of cases.

Inhalation anthrax occurs when aerosolized spores gain access to the alveoli of the lungs. Inhalation anthrax has historically been an industrial disease associated with exposure to spore contaminated hair and wool in an enclosed factory; it rarely occurs in an open air environmental setting. Though much rarer than cutaneous anthrax, gastrointestinal and inhalation anthrax are much more difficult to treat because they cause rapid systemic disease, toxin production, and often begin with non-specific initial symptoms which may result in a delay in seeking medical attention.

Two people working with infected bison carcasses during the Hook Lake outbreak in the summer of 1962 were exposed and contracted anthrax. One was exposed while performing a necropsy of one of the first detected cases without the use of appropriate safety precautions, and the second was exposed while working on heavy equipment that had been used in the outbreak response. Both individuals received prompt medical attention. Cutaneous anthrax was also retrospectively diagnosed in two wardens who developed skin lesions after they had handled a bison carcass in the WBNP in 1952. Both responded without incident to antibiotic therapy. All four cases involved the

improper handling of carcasses and a lack of proper safety apparel. Three of the four cases occurred before people were aware that anthrax existed in the area. In the years since the first recorded outbreak, there have been no documented cases of human exposure or illness in any personnel involved in outbreak response, and no public exposure. Overall, human exposure to the disease can be prevented through prophylactic vaccination and the use of appropriate personal protective equipment and use of appropriate biosecurity measures while working on anthrax carcasses.

Human vaccination against anthrax is available, and is recommended for ENR personnel likely to be involved in investigating or responding to anthrax outbreaks. At least six weeks are required for immunity to develop after vaccination, so pre-planning is required prior to the potential anthrax season.

During an anthrax outbreak, the Chief Public Health Officer of the NWT and public health officials will provide advice to the public and response team members on appropriate disease prevention and response measures. The use of appropriate Personal Protection Equipment (PPE), strict compliance with disease management protocols, and safe working practices are the key to prevent any potential exposure. Outbreak response teams must follow the protocols outlined in this AERP, as well as information on biosafety and general safe working recommendations provided by the Chief Public Health Officer, Chief Veterinary Officer and Incident Commander.

If anyone believes they have come in direct contact with a confirmed or suspect case of anthrax in a bison and is concerned about possible exposure, they need to contact their medical health care provider immediately.

ANTHRAX EMERGENCY RESPONSE PLAN OVERVIEW

2.1 Overview of Anthrax Management and Control in the NWT

The Department of ENR is the lead agency in dealing with anthrax in wildlife in the NWT. The Department's Wildlife Health Program coordinates a comprehensive program that includes anthrax research and monitoring, preparedness, disease outbreak response, interagency collaboration, and territorial and national reporting obligations. Much of this work is done collaboratively by ENR staff from multiple regions and divisions, other agencies, wildlife and human health organizations, universities, and anthrax topic specialists. Between outbreaks, ENR's anthrax planning work is done primarily by the Anthrax Advisory Group, which includes the Wildlife Veterinarian (disease expertise), Bison Ecologist (wood bison management), Manager of Public Affairs and Communication (public information and media relations), and South Slave Regional Superintendent (region where anthrax usually occurs).

When an anthrax outbreak occurs, the AERP is formally implemented and used to direct the Department's response. An Incident Command System (ICS) team will be put in place at that time to implement the AERP as written, taking direction from the Regional Superintendent responsible for the region where the outbreak is occurring (operational control) and the Department's Chief Veterinary Officer (disease control measures). The response will use the ICS organizational structure and operating procedures to guide operational implementation of the AERP.

2.2 Scope of the Anthrax Emergency Response Plan

This AERP applies to any outbreak of anthrax in any of the wood bison populations that are managed by the GNWT. Any outbreaks of anthrax within WBNP fall under the authority of Parks Canada, and ENR would only be involved if support was requested as part of an existing interagency collaboration agreement.

This emergency response plan represents the Department's position and approach to anthrax management, and provides the operational and technical approaches to be used in all anthrax outbreaks. The AERP has been approved by Senior Management and the Minister of ENR, and will be used to direct all aspects of the emergency disease response.

2.3 Purpose of the Anthrax Emergency Response Plan

The purpose of this emergency response plan is to provide clear direction to ENR staff on all aspects of a response to a case or outbreak of anthrax in free-ranging wood

bison. The AERP provides detailed instructions and protocols on the operational, technical, scientific, and disease control activities required to deal with a critical disease outbreak and management situation. It is reviewed and revised annually to reflect best practices and disease control measures, incorporating new scientific advances and lessons learned from outbreaks.

2.4 Goals and Objectives of the Anthrax Emergency Response Plan

Anthrax is endemic in the Slave River Lowlands and Mackenzie bison herd ranges, and future outbreaks are a real possibility. In the event of an outbreak, ENR will immediately implement anthrax disease control and management measures in support of Departmental wildlife disease control and bison management programs.

The overall goals of the AERP are:

- Protection of human health, and
- Minimizing impacts of anthrax on bison conservation and management.

The specific objectives of the Anthrax Emergency Response Plan are:

- Prevent human exposure to anthrax from wildlife outbreaks,
  (Through public information, area closures, carcass disposal)
- Protect response personnel from exposure to anthrax,
  (Through vaccination, PPE, strict and safe operational procedures)
- Detect all anthrax outbreaks that occur as quickly as possible,
  (Through routine surveillance flights, public reporting)
- Find and document as many anthrax mortalities as possible,
  (Through surveillance, recording GPS coordinates and carcass information)
- Prevent scavenging of carcasses and environmental contamination, and
  (Through immediate incineration, temporary tarping, chemical treatment)
- Effectively incinerate and disinfect every anthrax case detected.
  (Through burning using protocol outlined in AERP)

2.5 Key Steps Covered by the Anthrax Emergency Response Plan

The AERP provides guidelines and protocols to ensure an effective disease control and management response system that involves eight major steps:

1. Monitoring environmental conditions and bison health determinants for outbreak prediction.
2. Aerial surveillance.
3. Disease diagnostics.

4. Carcass disposal and site decontamination.
5. Human health protection.
6. Public and media relations.
7. Research and monitoring to support anthrax management and control.
8. Yearly review and revision of the AERP using adaptive management principles.

2.6 Activation of the Anthrax Emergency Response Plan

Routine monitoring is done each year in anthrax endemic areas, and any suspect anthrax cases are investigated. On suspicion of an outbreak (based on field case investigation and testing), the Anthrax Advisory Group will meet with the Regional Superintendent for the region where the outbreak is occurring, and ensure the Wildlife Director and Senior Management are notified.

Upon confirmation of an outbreak (based on field or laboratory testing), the AERP will be formally activated. An Incident Command System (ICS) team will be put in place at that time to implement the AERP as written, taking direction from the Regional Superintendent responsible for the region where the outbreak is occurring (operational control) and the Department Chief Veterinary Officer (disease control measures).

2.7 Incident Command System

The AERP utilizes the Incident Command System (ICS) to ensure an efficient and coordinated response to any outbreaks of anthrax in the NWT. ICS provides an organizational and operational framework to implement the Department's policy, approach and specific disease control protocols for dealing with anthrax outbreaks as outlined in detail in this AERP. The ICS structure provides clear roles and responsibilities for personnel, as well as a clear reporting structure. The system provides flexibility to adjust to any size anthrax outbreak; the number of ICS positions may vary between outbreaks, and in small outbreaks one individual may fill more than one position. The ICS organizational structure to be used for anthrax outbreaks is found in Appendix 9, and the roles and responsibilities of each position is found in Section 4.2.

2.8 Staffing the Anthrax ICS Organization Chart

The number of personnel involved and the ICS positions filled will depend on the size and complexity of the anthrax outbreak. The ICS organizational chart to be used for anthrax outbreaks is attached in Appendix 9. Not every position will be filled for every outbreak, and in some outbreaks one individual may fill several positions. At a minimum, every outbreak will have someone assigned to fulfil the roles of the following positions: Incident Commander, Chief Veterinary Officer, Information Officer, Safety Officer, Operations Section Chief, Planning Section Chief, Logistics Chief, and Disease

Management Branch Director. In larger outbreaks, additional positions will be activated (as outlined in the organization chart in Appendix 9), and some sections may be expanded as required (e.g. Disposal Crews).

2.9 Tiered Response Based on Outbreak Size

While the basic AERP principles and approach will apply regardless of the size of an outbreak, some operational approaches will have to be modified for large outbreaks (>50 mortalities). Number of personnel involved in an outbreak and the number of people required to fill each position will depend on the size of the outbreak. The decision to increase response capacity will be made by the Incident Commander based on current carcass numbers, an estimate of how long the outbreak has been going on and how long it will take to deal with current carcasses, as well as the rate of new cases and projected outbreak size.

In small outbreaks (relatively small numbers, slow rate of new cases), a small ICS team may be able to respond to an entire outbreak. The minimum ICS organization structure and positions to be filled in a small outbreak is summarized in Section 2.8. In small outbreaks, one individual may fill more than one role/position within the ICS system, and there will be generally only be one Surveillance Crew, one Sampling Crew, and one Carcass Disposal Crew. Administrative, logistical and other support may be provided by other ENR personnel not directly involved in the ICS response who would normally provide those services.

In larger or rapidly expanding outbreaks (larger numbers, moderate to high rate of new cases, significant resources projected to deal with all carcases), an emergency response is more difficult and challenging. The resource requirements (personnel, materials and supplies, facilities, financial) can be large. Operational and logistical requirements will also be high, and may present conflicting demands on ENR staff and resources pending other operational demands on the Department. The Regional Superintendent and Senior Management will play a critical role in accessing the required resources and balancing with other priorities.

In these large outbreaks, a full anthrax ICS organizational structure (as outlined in Appendix 9) will be required, and a description of the roles and responsibilities is found in Section 4.2. A large number of personnel will be required, and additional ENR staff from all other regions and headquarters will be required. In a large outbreak, there may be more than one person for each role/position. These individuals may serve in these roles concurrently or sequentially, based on operational needs and personnel break requirements. More than one Surveillance Crew, Sampling Crew Carcass and Disposal Crew may be established by the Incident Commander to meet operational

needs and allow for appropriate crew breaks. Additional equipment (e.g. aircraft) as well as materials and supplies (e.g. coal, wood, PPE) will need to be acquired to respond to large outbreaks. In addition, outbreak data collection and management becomes a challenge in large outbreaks.

2.10 Materials and Supplies to Start an Outbreak

Anthrax outbreaks are hard to predict, and can occur and expand very quickly. Enough materials and supplies to conduct initial field testing as well as the treatment and disposal of at least 25 carcasses should be kept on hand in both Fort Smith and Fort Providence. Once an outbreak occurs, the ICS team and the Logistics Chief must anticipate future needs of supplies and order in time to keep the outbreak response team resourced. A list of suppliers for the key materials and supplies required for an anthrax emergency response is listed in Appendix 12.

2.11 Financial Control

A separate financial code should be established in order to track expenditures for the anthrax outbreak response. Daily tracking of outbreak response expenditures and a tally of total costs to date will be done by the Finance and Administration Section Chief, who will work closely with the Regional Superintendent and regional Finance and Administration section to track, forecast and deal with financial requirements for the outbreak. Emergency financial procedures will be followed as directed by the Financial Management Board to facilitate immediate implementation of the AERP measures by the Minister of ENR.

2.12 Air Traffic Advisory and Air Operations

Fire Management Air Operations (ENR) will provide an advisory to the Ministry of Transport regarding the location of an anthrax control zone. All non-participating air traffic should be advised to fly above 3,500 ft. in the zone. A Notice to Airman (NOTAM) may be used to restrict access by aircraft.

Pilots (rotary wing and fixed wing) and engineers assigned to the anthrax field response will be provided with a briefing on anthrax, disease control measures and the AERP implementation process before being deployed to the field. Pilots flying rotary wing aircraft assigned to the anthrax emergency response should be rotated in accordance with established guidelines to prevent fatigue. All Departmental policies regarding air operations will apply (including those outlined in ENR's *2013 Air Crew Briefing Manual*).

2.13 Inter-Agency and Community Contacts during an Outbreak

Anthrax is a federally and territorially reportable disease, and certain agencies need to be contacted if an outbreak of anthrax is suspected or confirmed. In addition, a number of key community organizations, government agencies, neighbouring jurisdictions, and other key collaborators should be notified once anthrax has been confirmed. A contact list is attached in Appendix 5. A number of different ICS positions will be involved in providing a liaison function during the outbreak, based on the nature of the contact requirements. The Regional Superintendent will be the initial point of contact for local and regional community and Aboriginal governments, WBNP, and Senior Management. The Incident Commander will be the primary point of contact with local community and Aboriginal governments, local RCMP detachment and nursing station, and other local organizations and agencies during the outbreak. The Chief Veterinary Officer will serve as the primary point of contact with key animal health and public health organizations, including the Canadian Food Inspection Agency, provincial/territorial animal and wildlife health units, diagnostic laboratories, and GNWT Health and Social Services (H&SS).

2.14 Media Contacts

In order to minimize interference and coordinate dissemination of current results from field operations, information will be provided to the press by designated spokespersons. Unless specific instructions are otherwise made the operational crew will refer all media inquiries to the Manager, Public Affairs and Communication.

Anthrax outbreaks generate a high level of interest and concern in the public and in the media. Provision of timely and accurate information can keep the public well informed, help the public understand the situation, and prevent unnecessary concern or misconceptions. Meeting the demands of various media agencies is time-consuming, and has the potential to disrupt implementation of outbreak control measures. The Manager, Public Affairs and Communication will be designated to coordinate all media and public information, serving as the primary point of contact for the media and bringing in other personnel as required. This will ensure a timely, consistent and effective response to media and public inquiries, and allow field staff to remain focused on response delivery. The Manager, Public Affairs and Communication will act as a single window for the dissemination of information on the outbreak and response operations to outside agencies.

2.15 Anthrax Outbreak Data Collection and Management

The collection and assessment of anthrax outbreak data is critical to managing the current anthrax emergency response effort, increasing our understanding of how anthrax works, and improving disease management and control programs for the future. Complete and timely collection of data on the occurrence of cases (number, location, timing), individual case information (age, sex, state of carcass, scavenging, etc.), and management actions taken for each carcass (timing and nature of testing, treatment, disposal, etc.) are critical. From an immediate operational perspective, this information is critical to identify, track and assess the status of the emergency response implementation. Longer term, this information will be important to assess and improve ENR's anthrax research, monitoring and management programs.

During small outbreaks, the Anthrax Advisory Group and field response team will conduct or supervise collection of this data in the field, using field data forms for surveillance (Appendix 6), testing and carcass disposal (Appendix 7) and environmental sampling (Appendix 8). Each carcass will be given a unique identifier number; in most cases all data collection will be done by one field team using a serial numbering system (i.e. start at Carcass #1 and move up sequentially). The data will be collected and submitted to the Bison Ecologist, who will maintain it in a central database(s).

During a large outbreak, data collection and management can be challenging given the large number of cases, speed at which new information comes in, having multiple people involved in data collection, and competing demands for time. In a large outbreak, a dedicated individual (either the Planning Section Chief, or a Data Specialist in very large outbreaks) should be identified to oversee the collection and management of the data. Field crews will collect the information using the appropriate forms for surveillance (Appendix 6), testing and carcass disposal (Appendix 7) and environmental sampling (Appendix 8). These forms will be submitted daily to the Planning Chief or Data Specialist, who will enter the data in digital database(s).

2.16 Public Health and Safety Considerations

In the event that a case of anthrax in wildlife is suspected or confirmed, the GNWT Health and Social Services (H&SS) should be contacted immediately. The Chief Public Health Officer (867-920-6204) will serve as the contact person. Regular updates on the occurrence of further cases should be provided on an ongoing basis.

Personnel involved in disposal procedures will be briefed on human health considerations. Personnel selected to work on the disposal crews will be given appropriate training and equipment to perform the procedures safely and effectively.

Full PPE must be worn by all individuals whose activities put them in direct contact with dead bison or the immediate carcass site, as well as all individuals working with formaldehyde. Protocols are provided for PPE use for testing (Section 7.7.1), chemical treatment (Sections 8.5.1 and 8.5.2), and carcass disposal (Section 8.5.4). Information on the appropriate use of N95 respirator masks is found in Appendix 11.

When travelling to a carcass site by rotary wing aircraft, caution needs to be taken to make sure that the operation of the helicopter does not aerosolize any contaminated soil or material around a carcass. Pilots should be instructed not to hover over a carcass and to land cross-wind or upwind at least 50 m from the carcass. Where possible, the helicopter should try to land on green vegetation, and avoid landing in bison wallows, areas of bare earth or standing water.

An information program will be required to keep the general public informed of the situation, and to provide advice and warnings where necessary. A media advisory and anthrax backgrounder (Appendices 3 and 4) will be issued to the media and made available to the public on demand. Public service announcements on radio and television will be done as required to advise the public of the outbreak and public safety issues associated with it. Notices, signs and information items will be prepared and provided as required. Regular meetings with local community organizations will be held by the Regional Superintendent or their designate at the beginning and as required throughout an outbreak.

People travelling in an infected area may potentially be exposed to anthrax if they come in direct contact with a bison carcass or the immediate site where the carcass is located. The public will be advised of an outbreak and recommended not to travel to the area of an outbreak, and restriction on aircraft access (NOTAM) in the anthrax response area may be implemented. The decision on if or how to restrict public access will rest with the Regional Superintendent based on advice from the Incident Commander. Factors to be considered before making this public recommendation should include the extent of the outbreak, the accessibility of the area, and the time period from the last reported death.

If the Regional Superintendent decides to restrict public access to the area, the boundaries of the closure area should be based on an assessment of the recent location and movement of the affected herd, carcass locations, and areas where surveillance, wood cutting and carcass treatment crews are working. This type of analysis backing closure decisions will help to fully mitigate the potential risk of human exposure and risks to the public and work crews.

Hunting in the area of an anthrax outbreak during the immediate anthrax outbreak period may potentially expose hunters to both environmental and animal contact with anthrax. A public advisory should be made recommending a temporary voluntary ban on hunting in the area. This restriction can be safely lifted after the outbreak ceases. All public notices should advise against handling dead animals or picking up body parts such as bones or bison skulls found in the area.

2.17 Deactivation of the Anthrax Emergency Response Plan (AERP)

Once the field emergency response effort is completed and all personnel and equipment have been demobilized, the ICS team tasked to a specific outbreak will be deactivated. Follow-up to the outbreak and ongoing anthrax research and management activities will be done by the Wildlife Veterinarian and the Anthrax Advisory Group. The ENR personnel involved in an outbreak will participate in a post-outbreak operational review meeting to discuss, review and identify lessons learned from the outbreak response, which will feed into the annual review of the AERP.

RESPONSE TEAM PERSONNEL AVAILABILITY, ACCESS AND TRAINING

3.1 Personnel Availability and Access

Personnel for an anthrax emergency response are generally sourced from existing ENR staff from within the region where the outbreak is occurring and the Wildlife Division. When required, additional personnel may be brought in from other ENR Regions and Divisions, other Departments, and universities, and may also be requested from Parks Canada WBNP (interagency informal agreement). In addition, the Department can solicit the assistance of outside experts in the field of anthrax management and control; ENR currently has an agreement in place to access the assistance of Dr. Dan Dragon from the University of Alberta.

3.2 Departmental "Anthrax Response Team" Personnel Pool

ENR is in the process of developing and formalizing a process to identify and train a pool of departmental "Anthrax Response Team" personnel. ENR staff from all of the five regions will be identified by their Regional Superintendent and trained so that they can be accessed to assist with an anthrax outbreak in any other region.

During a large outbreak, large numbers of people are required to fill all of the required ICS response positions. In addition, in outbreaks extending over a long period of time, issues can arise with individuals reaching their maximum days on the incident (19 days) before a mandatory break. It is important to have a "pool" of ENR employees who already have the ICS and anthrax specific skills, training and experience required for each of the major positions in the ICS anthrax outbreak organizational structure.

In most outbreaks, the greatest demand for personnel will be for field Disposal Crew members. Given the nature of the response (emergency disease control under ICS control), it is also important to have a pool of individuals to staff the key leadership ICS positions (e.g. Incident Commander, Operations Chief, Disease Management Branch Director) who have both ICS leadership experience and disease control knowledge and experience. This will allow for the ICS team to be staffed promptly at the start of the outbreak, and for replacement personnel be rotated into positions in the event of a large, extended outbreak.

3.3 Training of Personnel Involved in Anthrax Management Activities

Training is a key component of an effective and safe anthrax emergency response. The AERP is targeted at reducing the impacts of anthrax outbreaks on wood bison

populations, as well as protecting public health and the safety of personnel involved in the response. Well trained personnel and clear, effective protocols are the key to successful and safe implementation of both goals.

The Department ensures that key anthrax response personnel (the Anthrax Advisory Group and other key individuals) are knowledgeable, trained and experienced in all aspects of anthrax detection, management and control, and are up to date on the best available information and practices on all aspects of anthrax in wildlife. This ongoing training and capacity building is critical to ensure that all of the Department's anthrax research, management and control programs are as effective as possible, and allows the Department to update and maintain the anthrax emergency response plan to reflect the best available science and proven disease management techniques.

Prior to the anthrax season, each ENR region should identify regional capacity to lead and staff the implementation of the Emergency Response Plan in the event of an anthrax outbreak in their region. In addition, each Regional Superintendent should identify regional staff members who could be available to participate in an "Anthrax Response Team" dealing with an outbreak in another region. Personnel are required at all levels of the anthrax ICS organizational structure (Appendix 9), and each region should identify individuals who could serve in any of the command and general staff positions. Personnel who will potentially serve in overhead team positions in the ICS structure should have ICS training (100, 200, 300 & 400) appropriate for the position they may fill.

Before the anthrax season begins, individuals identified as potential "Anthrax Response Team" members will be provided a copy of the AERP and the Department's new anthrax training DVD entitled "*Dealing with an anthrax outbreak*". The video provides an overview and training on all aspects of an anthrax emergency response, and is presented in chapters focusing on different aspects of an outbreak that an individual may be involved in. Each individual should watch all chapters of the training DVD that may apply to their ICS position and role. They should also familiarize themselves with the AERP, with an emphasis on their roles and responsibilities, and protocols and procedures to be done as part of their ICS position.

In the event of an outbreak, additional on-site training will be provided once individuals have been identified to participate in a response, travelled to the location of the outbreak, and have been assigned specific duties. This training is provided to field crews on site at the Incident Command Post prior to being mobilized in the field and includes initial and subsequent briefings, demonstrations of specific procedures, and review of detailed instructions for specific tasks in the AERP. If response personnel

have any questions after this training, they can contact the appropriate ICS team member for clarification and additional training at any time during the response.

3.4 Training and Briefings for Contractors and Other Outside Personnel

Information and briefings should be provided to all non-ENR personnel who may be involved in an anthrax outbreak response as a contractor (e.g. pilots and aircraft engineers), technical expert, student or volunteer. On first arrival to the emergency response location (Incident Command Post), contractors and other outside personnel must be given a full briefing on anthrax (general disease information, response activities being conducted, their role in the response, personnel safety, equipment safety and disinfection) before being sent out into the field. Every new individual will be required to view the training DVD (with recommendations on sections that apply to them that should be viewed), and should be briefed in person by one of the senior ICS personnel with a detailed knowledge about anthrax.

3.5 Field Response Crew Duty Length and Rotation

An anthrax field response can be a very difficult, tiring and stressful event for ICS team members. In some outbreaks, the response can go on for multiple weeks or even months. It is important to have sufficient numbers of personnel to fill the necessary ICS roles and to manage personnel to make sure people remain fresh and avoid fatigue.

The maximum time that an individual can remain on active duty for the outbreak is 19 days. After an individual has maxed out on time, they must be rotated off the field response and provided a break as defined by Department policy and procedures. Ideal length of time that individuals should be assigned to the ICS outbreak response will depend on the position they are assigned to, physical and mental demands of the position, and other factors. The Incident Commander should ensure that a personnel rotation schedule is set up and managed to ensure that all positions are filled, that replacements are available and on site to replace when people time out, and that rotation of crew positions is staggered so that there is always a combination of experienced and new staff members.

ROLES AND RESPONSIBILITIES

The Department Wildlife Health Program coordinates a comprehensive year-round anthrax program that includes research and monitoring, preparedness, disease outbreak response, interagency and inter-jurisdictional collaboration, and territorial and national reporting obligations. Much of this work is done collaboratively with ENR staff from multiple regions and Divisions, and other agencies, wildlife and human health organizations, universities, and topic specialists. ENR's Bison Program is responsible for all aspects of wood bison management and conservation, and plays an important role in understanding and managing the impact of anthrax on this threatened species. Between outbreaks, ENR's anthrax planning and preparedness work is done primarily by the Anthrax Advisory Group, which includes the Wildlife Veterinarian, Bison Ecologist, Manager of Public Affairs and Communication, and the Regional Superintendent (South Slave).

During outbreaks, the Department's AERP is implemented, and an ICS team is activated to implement the AERP. A substantial amount of personnel and resources are required to effectively implement this response and Department staff from both the region where the outbreak is occurring and from across the NWT are required. A system of identifying, training and accessing personnel is in place to support outbreak response activities.

4.1 Positions Dealing with Anthrax Management and Control Year Round

A number of ENR positions are active in anthrax research, monitoring and management activities on an ongoing basis between and during outbreaks. The four key ENR positions involved in the issue year round also constitute the department's Anthrax Advisory Group.

4.1.1 Wildlife Veterinarian

The Department Wildlife Veterinarian (and NWT Chief Veterinary Officer) plays a lead role in anthrax research, monitoring, strategic planning, outbreak preparedness, disease outbreak response, territorial and national reporting obligations, and interagency collaboration.

The Departmental Wildlife Veterinarian (and NWT Chief Veterinary Officer) will:

- Serve as the Department lead on anthrax research and management activities in collaboration with the Bison Ecologist, Anthrax Advisory Group, and other key partners involved in anthrax and wildlife health management.

- Provide technical expertise, information and advice on anthrax in wildlife.
- Chair ENR's Anthrax Advisory Group.
- Maintain the AERP, and update as required.
- Chair Departmental annual pre-season meetings, post-outbreak review meetings, and anthrax research and management workshops.
- Monitor environmental conditions to identify potential anthrax outbreaks.
- Ensure surveillance flights are conducted in the Mackenzie bison range and Slave River Lowlands each summer.
- Conduct and provide advice on sampling of suspect anthrax cases.
- Contact and serve as the liaison with the Canadian Food Inspection Agency, provincial/territorial wildlife health programs, Prairie Diagnostic Services, outside anthrax experts, and GNWT H&SS.
- Act as the liaison with Prairie Diagnostic Services and other diagnostic laboratories concerning testing of samples from suspect anthrax cases.
- Provide advice and assistance to the Manager, Public Affairs and Communication on the development of anthrax information material.
- Coordinate, conduct and provide advice for targeted research on anthrax to better understand the disease and improve anthrax management measures.
- Identify key individuals in the wildlife disease management and research community who should be updated on an outbreak situation, and potential collaborators for ongoing and planned research projects.

4.1.2 Bison Ecologist

ENR's Bison Program is responsible for all aspects of wood bison management and conservation, and plays an important role in understanding and managing the impact of anthrax on this threatened species. The Bison Ecologist is involved in understanding the impacts of anthrax on wood bison populations, identifying information gaps to better understand this impact, and collaborating with ENR and outside anthrax experts to get this information and support anthrax research, and plays a critical role in responding to anthrax outbreaks in NWT bison populations.

The Bison Ecologist will:

- Serve on ENR's Anthrax Advisory Group.
- Participate in Departmental annual pre-season meetings, post-outbreak review meetings, and anthrax research and management workshops.
- Working with the Wildlife Veterinarian, ensure regular surveillance flights are conducted in the Slave River Lowlands and Mackenzie bison herd each summer.
- Incorporate information on anthrax into bison conservation and management planning processes, including the *NWT Wood Bison Strategy* and herd specific management plans.
- In the event of an outbreak, provide technical advice and direction to make sure bison management and conservation issues are addressed.

- Participate in the successful implementation of the AERP.
- During anthrax outbreaks, serve as a technical advisor to ensure wood bison management and conservation issues are addressed in the AERP implementation.
- Take a lead role in ensuring collection and storage of anthrax surveillance, mortality and response data.

4.1.3 Regional Superintendent (South Slave)

The Regional Superintendent (South Slave) plays a critical role in anthrax research, management and control, given the fact that anthrax is endemic in two bison herds in the South Slave Region, and the position has been a key player in past anthrax activities. Between outbreaks, the Regional Superintendent serves on the Anthrax Advisory Group, which provides advice to the Department on anthrax research, management and control. During an outbreak in the South Slave Region, the Regional Superintendent will be responsible for operational implementation of the AERP, and activation and supervision of an Incident Command Team. The Superintendent will work closely with the Chief Veterinary Officer to make sure the AERP implementation achieves disease control objectives.

The Regional Superintendent will:

- Serve on ENR's Anthrax Advisory Group.
- Participate in Departmental annual pre-season meetings, post-outbreak review meetings, and anthrax research and management workshops.
- Provide input, direction and support for anthrax research, management and control activities.
- Implement the AERP in the event an outbreak occurs in the South Slave Region.
- Activate an ICS team and appoint an Incident Commander to conduct the field implementation of the AERP.
- Work closely with the Wildlife Veterinarian and the Bison Ecologist to make sure all anthrax management and response activities are effective and meet the Department's goals and objectives (as laid out in the AERP).

4.1.4 Manager, Public Affairs and Communications

The Manager, Public Affairs and Communications is responsible for overall public and media information and communications on anthrax, both during and between outbreaks.

The Manager, Public Affairs and Communications will:

- Serve on ENR's Anthrax Advisory Group.
- Participate in Departmental pre- and post-outbreak planning and debriefing sessions to provide input on communications strategies.
- Develop public information materials (e.g. information sheets on the website) about anthrax in general, and in response to specific outbreaks.
- Serve as the Department's main point of contact for media requests for information during anthrax outbreaks.
- Identify key Departmental staff and outside technical experts to fulfill specific media information and interview requests.
- Attend public information sessions during and after outbreaks as required.

4.1.5 Key Partners in Anthrax Research and Management

A number of outside agencies and organizations work collaboratively with ENR on anthrax research, management and control. Some agencies have a formal mandate or regulatory role in some aspects of the disease (Canadian Food Inspection Agency, WBNP, GNWT H&SS, Workers Safety and Compensation Commission). Other organizations work collaboratively with ENR on anthrax research, monitoring and diagnostics (Canadian Food Inspection Agency, Canadian Cooperative Wildlife Health Centre, Centre for Coastal Health, University of Saskatchewan, University of Calgary, and University of Alberta). The Wildlife Veterinarian and the Anthrax Advisory Group serve as the Department liaison with these outside organizations.

4.2 Positions Activated Under ICS during an Outbreak

When an outbreak occurs, the Regional Superintendent will activate an ICS anthrax response team (Appendix 9) that will be responsible for operational implementation of the AERP during the outbreak. Once the field response is completed, the ICS team will be formally deactivated.

4.2.1 Regional Superintendent

During an outbreak, the Regional Superintendent (for the region in which the outbreak occurs) will be responsible for operational implementation of the AERP. In the event that an outbreak occurs in two regions simultaneously, the Assistant Deputy Minister (Operations) will determine which Superintendent will lead the ICS team and AERP implementation.

The Regional Superintendent will activate an Incident Command Team, which will be responsible for implementation of the AERP. The Regional Superintendent will provide operational direction to the Incident Commander, and will prioritize and approve response activities in relation to other Department activities. The Superintendent will

work closely with the NWT Chief Veterinary Officer who will provide direction on all disease control and management strategies and tactics to make sure the field implementation of the AERP achieves ENR's disease control objectives. The Superintendent will also work closely with the Bison Ecologist to ensure the emergency response plan meets all bison management and conservation objectives.

The Regional Superintendent will:

- Activate and supervise an Incident Command Team to implement the AERP when an outbreak occurs.
- Work with Senior Management and other Regional Superintendents to acquire ENR personnel to fill required ICS positions for the field response.
- Provide direction to the on-site Incident Commander, and ensure the field response is done in strict compliance with the Emergency Response Plan.
- Work closely with the Chief Veterinary Officer to make sure the AERP implementation is effectively meeting disease control objectives.
- Review and confirm the Incident Action Plans produced by the ICS team.
- Review and when appropriate approve recommendations of the Incident Commander for allocation of additional staff, resources and facilities.
- Identify and secure required financial resources to conduct field response.
- Coordinate FMB submissions for supplementary funding as required.
- Ensure all necessary records (financial, IAP, etc.) from the field operations are being completed and filed with appropriate personnel.
- Regularly brief the Assistant Deputy Minister (Operations) and the Wildlife Director on the status of the field response.
- When anthrax has been confirmed, work with the Manager, Public Affairs and Communications to issue media advisories and public information.
- Contact local and regional community and Aboriginal governments to provide an initial notification and subsequent updates on the anthrax outbreak.

4.2.2 Incident Commander

The Incident Commander will be appointed by and report to the Regional Superintendent (of the region where the outbreak is occurring) once an anthrax outbreak has been identified and confirmed. The Incident Commander will be responsible for implementation of the AERP and supervision of the ICS team. The Incident Commander will take direction from the Regional Superintendent (operational control) and the Chief Veterinary Officer (disease control measures) to ensure an effective disease control response to the outbreak.

The Incident Commander will:

- Oversee the field implementation of the AERP by the ICS team.

- Establish an incident command post at a site in the community that meets operational requirements (separate from fire ops centre to avoid interference).
- Ensure all ICS positions required for the size and complexity of outbreak are staffed (see Section 4.2 and Appendix 9).
- Ensure that all required personnel, materials, equipment, facilities and other resources required for the response are available on site.
- Approve requests for additional resources or the release of resources.
- Coordinate with the Territorial Forest Fire Centre, Regional and Territorial Duty Officer, and Regional Superintendent to ensure incident requirements and operations are coordinated with other Departmental activities and priorities.
- Coordinate the operational activities of all command and general staff.
- Ensure planning and operational briefing meetings are scheduled and conducted.
- Identify immediate priorities, objectives and strategies for each operational period in order to achieve the AERP protocols and objectives.
- Approve and authorize the implementation of the daily Incident Action Plan, and ensure it is consistent with the AERP protocols and objectives.
- Work closely with the Chief Veterinary Officer to make sure the AERP implementation is effectively meeting disease control objectives.
- Ensure that daily records of all activities involved with the response are being kept by appropriate personnel.
- Ensure adequate safety measures are in place and followed.
- Serve as the liaison with local community and aboriginal governments, RCMP, and other government agencies (Highways, H&SS, etc.).
- Provide information updates to the local community through public meetings, local radio updates, and signage where appropriate.
- Keep the Regional Superintendent and Senior Management informed and briefed on incident status.
- Order the demobilization of the incident and ICS team when appropriate.

4.2.3 Chief Veterinary Officer (Command Staff)

The Chief Veterinary Officer is responsible for ensuring an effective disease control response to all anthrax outbreaks, through development and accurate field implementation of the AERP. The Chief Veterinary Officer will provide direction to the Incident Commander and ICS team on disease control and management strategies and tactics to make sure the field implementation of the AERP achieves ENR's disease control objectives.

The Chief Veterinary Officer will:

- Provide direction to the Incident Commander on all aspects of anthrax control and management to ensure the AERP implementation is effectively meeting all aspects of disease control principles and objectives.

- Provide technical expertise, information and advice on anthrax (disease information, management and control principles and procedures, personnel safety etc.) to the Incident Commander, Planning Chief and Anthrax Response Team members.
- Serve as the liaison with other animal and human health agencies, including Canadian Food Inspection Agency, provincial/territorial wildlife health programs, and GNWT H&SS.
- Ensure that the AERP and its disease control measures are being implemented correctly, and adjust as required.
- Conduct and provide advice on sampling and laboratory testing of suspect anthrax cases.
- Act as the liaison with Prairie Diagnostic Services and other diagnostic laboratories concerning testing of samples from suspect anthrax cases.
- Assess surveillance requirements from a disease management perspective, and provide recommendations to the Incident Commander, Operations Chief and Disease Management Branch Director.
- Assess field implementation of carcass treatment protocols and procedures, identify issues or concerns that need to be addressed, and provide direction to the Incident Commander, Planning Chief, and Disease Management Branch Director.
- Provide advice and assistance to the Manager, Public Affairs and Communication in providing public information and responding to media requests for information.
- Ensure field implementation of key anthrax sampling, monitoring and research projects in collaboration with other ENR staff and research collaborators.

4.2.4 Information Officer (Command Staff)

The Information Officer is responsible for overall public and media information and communications on anthrax, both during and between outbreaks.

The Information Officer will:

- Participate in initial briefing meeting with ENR Senior Management.
- Release a media advisory upon confirmation of an anthrax outbreak.
- Liaise with GNWT H&SS communications staff to ensure a unified public message on anthrax.
- Serve as the Department's main point of contact for media requests for information during anthrax outbreaks.
- Identify key Departmental staff and outside technical experts to fulfill specific media information and interview requests.
- Attend public information sessions during and after outbreaks as required.

4.2.5 Safety Officer (Command Staff)

The Safety Officer is responsible for measures to ensure response team personnel safety during all operational activities during the AERP implementation. The Safety Officer will anticipate and assess hazardous and unsafe situations, and deal with ICS team member health and safety issues.

The Safety Officer will:

- Anticipate and assess hazardous and unsafe situations.
- Ensure that identified safety hazards and prevention recommendations are incorporated into the daily Incident Action Plan and the daily Operational Period Briefing.
- Ensure field response crews comply will all recommendations for PPE and protocols for safely conducting carcass testing and treatment are done as outlined in the AERP.
- Report any health and safety concerns to the Incident Commander.

4.2.6 Planning Section Chief (General Staff)

The Planning Section Chief is responsible for providing planning services for the anthrax outbreak incident. The Planning Section Chief will collect information on the status of the outbreak, the response activities, and resources available and used for the response. S/he will evaluate and assess this information, and will incorporate it into the development of daily Incident Action Plans. The Planning Section Chief will disseminate this information through the Incident Action Plans, daily Planning Meetings and Operational Period Briefings, and a status board display with maps at the Incident Command Post.

The Planning Sector Chief will:

- Collect and manage all incident-relevant operational data.
- Work with the Incident Commander, Operations Chief, Chief Veterinary Officer, and Technical/Science Experts to incorporate the outbreak information, AERP protocols and disease control principles into the preparation of the Incident Action Plan.
- Supervise preparation of daily Incident Action Plans (Appendix 10).
- Conduct and facilitate daily Planning Meetings each evening.
- Ensure that key data collection forms are completed by field crews, and submitted daily to the Planning Section Chief.
    - Anthrax Surveillance Report (Appendix 6) and flight track logs.
    - Anthrax Carcass Testing and Disposal Form (Appendix 7).
    - Anthrax Carcass Site Environmental Sampling Form (Appendix 8).

  - Radio operator communications log.
  - Staging area daily inventories (# of loads, weight of fuels).
- Ensure that anthrax field data is entered into an electronic database.
- Coordinate production of GPS based maps as required.
- Compile and display incident status information in the Incident Command Center.
- Determine the need for specialized resources to support the incident.
- Oversee preparation of the demobilization plan.

4.2.7 Operations Section Chief (General Staff)

The Operations Section Chief is responsible for managing the tactical operations required for the field implementation of the AERP.

The size and structure of the Operations Section will vary depending on the size and complexity of the anthrax outbreak. The organizational structure of the section found in Appendix 9 will be used for all outbreaks, and the number of tactical response crews can be increased as required.

The Operations Section Chief will:

- Manage all field tactical operations required for AERP implementation.
- Provide input into the development of the operations portion of the daily Incident Action Plans (Appendix 10).
- Conduct daily Operational Period Briefings for tactical field crews each morning.
- Supervise the implementation of the field tactical operations and assignments outlined in the daily Incident Action Plan.
- Coordinate personnel and equipment in the field.
- Supervise radio operator.
- Request additional resources to support tactical operations as required.
- Allocate aircraft resources to field crews each operational period.
- Ensure fuel resources are in place to support aircraft activities.
- Approve release of resources from active assignments.
- Ensure that all safety procedures are followed in the field.
- Maintain regular contact and close communications with field crews.
- Keep notes on the daily activities of each crew (crew members and location, work completed) and the rotor wing aircraft (assignments, flight times).
- Report daily progress, any new findings or incidents to the Incident Commander.
- Arrange periodic response monitoring flights for key AERP personnel (Incident Commander, Operations Chief, Chief Veterinary Officer, Technical/Science Experts and Disease Management Branch Director) to tour the outbreak area to assess the situation, progress to date, operational issues, and effectiveness of disease control measures).

4.2.8 Logistics Section Chief (General Staff)

The Logistics Section Chief is responsible for ensuring that all incident support needs are met (supplies, equipment, facilities, personnel), with the exception of logistics support to air operations. In a small outbreak, the functions of this position may be filled by existing ENR personnel normally involved in acquiring these resources. In a large outbreak, a dedicated on-site Logistics Section Chief will be required.

The Logistics Section Chief will:

- Manage all incident logistics.
- Ensure all required materials, supplies, equipment and facilities need to manage an outbreak are on hand.
- Maintain a secure storage location and inventory for all materials, supplies and equipment.
- Anticipate future needs supplies to meet operational demands, and respond to requests from the Operations Chief and IC for additional supplies.
- Order additional materials, supplies and equipment as required.
- Purchasers on SOAs when a vendor for goods is available, and pays by invoice whenever possible (reduce amount on VISAs).
- Maintain and submit all original receipts (VISA purchases) and invoices, and submit to Finance and Administration Chief.
- Make sure all equipment is in good working condition.
- Arrange for ICS anthrax response team housing and food requirements.
- Arrange for communication systems and supplies:
    - Hand held radios,
    - Satellite phones for field crews,
    - Radio operator station and equipment,
    - Multiple phone lines in Incident Command Post,
    - Computers for key ICS command and general staff, and
    - Computer network connections.
- Provide logistical input to the Incident Commander and Planning Section Chief in preparing the Incident Action Plan (IAP).
- Oversee demobilization of the logistics section.

4.2.9 Finance/Administration Section Chief (General Staff)

The Finance and Administration Section Chief is responsible for managing all financial aspects of an incident, including total project costs, procurement costs, staff time, and injury compensation/claims. In a small outbreak, the functions of this position may be filled by existing ENR personnel normally involved in acquiring these resources. In a large outbreak, a dedicated on-site Finance and Administration Section Chief will be required.

The Finance and Administration Section Chief will:

- Manage all financial aspects on an anthrax response effort.
- Maintain financial and cost analysis information, and provide as requested.
- Oversee hiring of additional personnel to work on crews
- Maintain personnel documentation (log of personnel working each day based on daily sign in/sign out sheets), and ensure time reporting.
- Ensure that all personnel and equipment time records are accurately completed and transmitted to ENR.
- Ensure any compensation and claims functions are being addressed.
- Provide logistical input to the Incident Commander and Planning Section Chief in preparing the Incident Action Plan.
- Maintain daily contact with regional and headquarters ENR Finance and Administration sections on finance matters.
- Brief ICS and ENR administration personnel on all incident-related financial issues needing attention or follow-up.
- Provide financial input into development of the demobilization plan.

4.2.10 Disease Management Branch Director

The Disease Management Branch Director is responsible for ensuring the effective field implementation of surveillance, testing, and carcass disposal operations as specified in the AERP to ensure disease control objectives are met. The Disease Management Branch Director will be staffed by an individual with extensive knowledge and experience on anthrax, bison, and disease management and control. The Disease Management Branch will include one or more surveillance crews, testing crews, and carcass disposal crews depending on the size and complexity of the outbreak.

The Disease Management Branch Director will:

- Supervise field implementation of the surveillance, testing and carcass disposal components of the AERP.
- Ensure that the AERP and its disease control measures are being implemented fully and correctly.
    - Surveillance Crew(s) will conduct surveillance flights as specified in the AERP and daily Incident Action Plan and complete and submit Anthrax Surveillance Reports (Appendix 6) for each flight.
    - Testing Crew(s) will conduct carcass and environmental sampling as specified in the AERP and daily Incident Action Plan and complete and submit appropriate field testing reports (Appendices 7 and 8).
    - Carcass Disposal Crew(s) will complete treatment of every carcass detected through chemical disinfection, or incineration and submit Anthrax Carcass Testing and Disposal Forms (Appendix 7).

- Assess field implementation of carcass treatment protocols and procedures, and identify any issues or concerns that need to be addressed.
- Ensure field implementation of key anthrax sampling, monitoring and research projects in collaboration with other ENR staff and research collaborators.

4.2.11 Surveillance Crew Leader

The Surveillance Crew Leader will be responsible for planning, conducting and reporting on aerial surveillance flights scheduled in the Incident Action Plan. Surveillance crews will include at least two individuals, and will follow procedures outline in the AERP.

The Surveillance Crew will:

- Conduct aerial surveillance flights (by fixed-wing or rotary wing aircraft) to look for possible anthrax mortalities and locations of live bison.
- When deemed appropriate, conduct aerial surveillance flights using infra-red or other heat detecting technology to enhance carcass detection in wooded areas.
- Follow the AERP guidelines and protocols for surveillance flights outlined in Section 6 of the AERP.
- Identify and document any new carcasses by collecting a GPS coordinate for the carcass and where possible dropping a marker at the area.
- Compete and submit an Anthrax Surveillance Report (Appendix 6) for each surveillance flight completed.

4.2.12 Testing Crew Leader

The Testing Crew Leader will be responsible for planning, conducting and reporting on all carcass and environmental sampling and disease testing. Testing crews will include at least two individuals, and will follow procedures outline in the AERP.

- Testing Crew(s) will conduct carcass and environmental sampling as specified in the AERP and daily Incident Action Plan and complete and submit field reports (Appendices 7 and 8).

The Testing Crew will:

- Conduct field collection of samples (suspect cases, environmental samples) to be submitted for laboratory testing and confirmation of anthrax.
- Conduct sampling and field testing using protocols outlined in Section 7.1 of the AERP.
- Conduct carcass site testing of suspect anthrax cases using the unofficial field test kits as described in Section 7.1.5.
- Treat carcass with formaldehyde solution once sampling is complete.

- Complete and submit a report on sampling for either carcasses (Appendix 7) or environmental samples (Appendix 8).
- Use all appropriate PPE and safe operating procedures as outline in the AERP.
- Follow field safety procedures, and report any incidents at the end of the shift.

4.2.13 Carcass Disposal Crew Leader

The Carcass Disposal Crew Leader will be responsible for supervising a Carcass Disposal Crew in the field to conduct and report on all carcass treatment and disposal activities in the field. Disposal Crews will consist of three to five people. Carcass treatment and disposal assignments will be provided in the daily Incident Action Plan, and will be conducted following the specific protocols outlined in AERP.

The Carcass Disposal Crew Leader will:

- Supervise the Disposal Crew in conducting carcass treatment and disposal.
- Supervise the aircraft assigned to the Carcass Disposal Crew.
- Conduct carcass treatment and disposal activities following the specific protocols outlined in Section 8 of the AERP.
- Ensure the fire at each carcass site is under control prior to leaving the location.
- Compete and submit a Carcass Testing and Disposal Report Form (Appendix 7) for every carcass that is dealt with in the field.
- Keep records of all activities and progress during the operational period (including number and location of carcasses worked on and completed).
- Use all appropriate PPE and safe operating procedures as outline in the AERP.
- Follow field safety procedures, and report any incidents at the end of the shift.
- Report any operational requirements to the Operations Section Chief to ensure that the crew has required personnel and equipment required.

4.2.14 Staging Area Supervisor

The Staging Area Supervisor will be responsible for supervising the resources (wood and coal) at the staging area, as well as a Wood Cutting Crew(s), a Coal Bagging Crew(s), and a Sling Loading Crew(s).

The Staging Area Supervisor will:

- Maintain an inventory of the amount of wood and coal at the staging area.
- Anticipate future requirements for wood and coal based on current rate of use, and request additional resources as required from the Operations Chief.
- Supervise a Wood Cutting Crew(s) consisting of two to five people that will cut green and dry wood into eight foot lengths as required.
- Supervise a Coal Bagging Crew(s) consisting of two to five people that will put 50 lbs. of coal into fur bags (or suitable alternatives).

- Supervise a Sling Loading Crew(s) consisting of two to five people that will load nets with wood and coal (based on requested loads from Carcass Disposal Crews), and hook up the slings to rotary wing aircraft long lines.
- Maintain an inventory of all sling loads sent out during the operational period (record fuel type and volume, time and date, aircraft call sign, and destination for each of the loads that goes out each day).
- Follow field safety procedures, and report any incidents at the end of the shift.

4.2.15 Radio Operator

The Radio Operator will serve as the communication link between field operations and ICS staff. A communications centre will be set up at the Incident Command Post, with dedicated radio equipment and a radio operator. An Incident Communications Plan will be developed, and included in the daily Incident Action Plans. A radio frequency for communication among field response personnel will be identified, trying to avoid overlap with the frequency used for district operations to avoid interference.

The Radio Operator will:

- Maintain a communications center for radio contact and communication with field personnel.
- Maintain a record of all radio communications and operational information provided, including the locations of field crew and aircraft.

4.2.16 Technical Advisors

A number of Technical Advisors may be involved in an anthrax emergency response to provide specific technical expertise that will assist the ICS team with implementation of the Anthrax Emergency Response Team. Technical Advisors will report to the Planning Section Chief initially, and may be reassigned to other areas of the organization structure.

In all outbreaks, the Wildlife Veterinarian (anthrax information and disease control) and Bison Ecologist (bison information, management and conservation) will be available to serve as technical advisors in their topic areas, but will also fill several formal ICS anthrax response team positions and leadership roles. Additional outside technical experts may be brought in (in person, phone or email) to contribute in such areas as anthrax, disease management and control, surveillance, worker and public safety, etc.

The Technical Advisors will:

- Provide technical expertise, information and advice on specific topics and areas of expertise to support field implementation of the AERP by the ICS Anthrax Response Team.

ANTHRAX PLANNING AND COORDINATION (OUTBREAK AND NON-OUTBREAK)

5.1 Anthrax Planning Between Outbreaks

5.1.1 Ongoing Departmental Anthrax Planning and Coordination

The Department's Wildlife Health Program coordinates a comprehensive program that includes anthrax research and monitoring, preparedness, disease outbreak response, interagency collaboration, and territorial and national reporting obligations. Much of this work is done collaboratively with ENR staff from multiple regions and Divisions, and other agencies, wildlife and human health organizations, universities, and topic specialists. Between outbreaks, ENR's anthrax planning work is done primarily by the Anthrax Advisory Group, which includes the Wildlife Veterinarian, Bison Ecologist and Regional Superintendent (South Slave).

5.1.2 Pre-season Interagency Anthrax Planning Meeting

Each year, the Department will coordinate a pre-season interagency planning meeting prior to the "anthrax season" to make sure the Department is prepared in the event of an outbreak. Participants will include key ENR personnel (Anthrax Advisory Group, technical experts, media specialist, and potential ICS team leaders), WBNP personnel, public health officials, and key anthrax specialists and collaborators. The meeting will cover all aspects of anthrax management for the coming season including:

- AERP Status (ENR and WBNP).
- Materials and supplies (stock on hand, and sources for accessing more).
- Staff readiness and preparedness.
- Surveillance and testing.
- Communications and media.
- Research and monitoring.

Meeting outcomes will include:

- Meeting minutes.
- Inventory of personnel, materials and supplies available for an outbreak.
- Action plan to acquire any additional resources required.
- Ensure enough materials and supplies are on-hand in both Fort Smith and Fort Providence to be able to handle at least 25 carcasses at the start of an outbreak.

5.1.3 Post-Outbreak Anthrax Debriefing Meeting

After each anthrax outbreak, the Department will coordinate a post-outbreak anthrax debriefing meeting in the fall once the emergency response is wrapped up and the "anthrax season" is over. Participants will include key ENR personnel (Anthrax Advisory Group, technical experts, media specialist, ICS team leaders and key team members), public health officials, and key anthrax specialists and collaborators. The meeting will review the outbreak, operational implementation of the anthrax emergency response by the ICS team, effectiveness of disease control measures, research and monitoring conducted, lessons learned, and information and knowledge gaps. This operational, disease management and science review will be used to update the AERP, identify key information and research gaps, and develop a plan to address these information needs.

Meeting outcomes will include:

- Meeting minutes.
- Information to be used to update AERP.
- Revised Departmental anthrax research, management and control plans.

5.1.4 Anthrax Research and Management Workshops

Effective anthrax management and control requires a solid understanding of the ecology of the disease and how it works in northern Canada. Information on the interaction of the host, pathogen and environment will inform our understanding of what causes and drives outbreaks, what the implications are for bison management and conservation, and options for managing or controlling the disease. Targeted research on various disease control measures is important to allow us to refine the AERP in order to increase effectiveness and achieve objectives.

The Department works closely with other agencies, wildlife and human health organizations, universities and other specialists who work with anthrax. Every three to four years, the Department coordinates an Anthrax Research and Management Workshop to bring together these key partners and collaborators to discuss advances in knowledge on anthrax, with an emphasis on addressing major knowledge gaps and enhancing ENR's field management of the disease.

Meeting outcomes will include:

- Meeting minutes.
- Action plan for collaborative anthrax research, management and response efforts with outside partners.

5.1.5 ENR Research Planning

Additional research into anthrax is required to better understand the disease, and to enhance and improve disease management and control techniques in the future. Some of this work can only be done during an anthrax outbreak, and it is critical that ENR is prepared to use the opportunity of an outbreak to conduct this work. It is impossible to predict when and where anthrax outbreaks will happen, and once one occurs the effective implementation of the AERP and protection of public health are the immediate priorities. As a result, it is important to identify and prioritize information gaps and plan potential research opportunities well in advance of an outbreak in order to successfully incorporate them into the field response.

This process will include identifying key questions and information needs to improve anthrax management and response, planning the research design and measurable outcomes, identifying ENR personnel and collaborators to do the work, and securing funding in advance of an outbreak. This planning process will greatly enhance the ability to conduct important research and monitoring during an outbreak. ENR maintains a list of key anthrax information needs and proposed research proposals, which is prepared and maintained by the Anthrax Advisory Group. An update of the research planning document will be completed as part of an ongoing Wildlife Health Program review.

5.2 Operational Meetings and Planning Documents during an Anthrax Outbreak

When an anthrax outbreak occurs, the AERP will be formally activated and an ICS team will be put in place. Communication and coordination are critical for successful implementation of the AERP, both within the ICS response team and with the Department (and other outside agencies). The approach taken will depend on the size and complexity of the outbreak, and the ICS provides an operational framework that can be applied as required in a response.

There are several key operational meetings, briefings and planning documents that will be used during every outbreak.

5.2.1 Initial Briefing of Regional Superintendent by Anthrax Advisory Group

On suspicion of an outbreak (based on initial field case investigation), the Anthrax Advisory Group will ensure that the Regional Superintendent (region where outbreak has been detected) and Wildlife Director are immediately notified. The Anthrax Advisory Group will meet with the Regional Superintendent immediately to provide a briefing on

the situation, discuss options and approaches for implementation of the AERP based on the current and projected outbreak size, and immediate steps required while ICS team and field response is being mobilized.

5.2.2 Initial Briefing of Departmental Senior Management

On suspicion of an outbreak (based on initial field case investigation), the Wildlife Veterinarian and Bison Ecologist will ensure that the Regional Superintendent, Wildlife Director and Senior Management are immediately notified. Senior management will inform the Minister of the situation at the appropriate time.

Senior Management will convene a meeting of the Anthrax Advisory Group and key regional and headquarters Department personnel to discuss the details of the situation, implementation of the AERP, appointment of an ICS team, identification of operational needs and resources, and a public communication plan. Additional meetings of key Department personnel will be convened during the outbreak by Senior Management as required.

5.2.3 Incident Commander Appointment and Transfers of Command

Once the AERP and an ICS team have been activated, an Incident Commander will be appointed by the Regional Superintendent (for the region where the outbreak is occurring) to oversee the field implementation of the AERP. Upon initial appointment of the Incident Commander, an initial briefing of the incoming Incident Commander by the Regional Superintendent and the Anthrax Advisory Group will be held to provide an update on the situation, activation of the ICS Team, implementation of the AERP, and disease and management control issues.

During any subsequent transfer of command to a new Incident Commander, a briefing should occur to provide the incoming Incident Commander with an update on the current situation, operational objectives, and any other issues associated with field AERP implementation. The briefing will be led by the outgoing Incident Commander with input from the Chief Veterinary Officer, Disease Management Branch Director and Science/Technical Experts on disease control issues.

5.2.4 Initial Briefing of ICS Overhead Team

Once an ICS team has been activated, staffed and convened at the location of the anthrax outbreak, an initial meeting of the ICS overhead team and key resource people should be held at the Incident Command Centre. This meeting will provide an opportunity to apprise all team members of the outbreak situation, outbreak response

and disease control objectives, proposed course of action to implement the AERP, and roles and responsibilities for each of the overhead team. This will also provide an opportunity to brief all overhead team members on anthrax itself, disease control principles, the AERP and its implementation, and ICS anthrax outbreak procedures and protocols.

5.2.5 Daily Planning Meetings

Once the AERP has been implemented and an ICS team activated, daily planning meetings will be held to review operations completed each day and make plans for the coming operational period (usually a 24-hr period). The meetings will be organized and led by the Planning Section Chief, and will include the Incident Commander, Chief Veterinary Officer, Safety Officer, Operations Section Chief, Logistics Chief, Finance and Administration Chief, Disease Management Branch Director, and Treatment, Testing and Surveillance Crew leaders. The meetings will cover operational activities and issues from the previous operational period, and plan for the next operational period. The meetings will be held at the end of the operational period, will be brief (≤30 minutes), and will cover the following agenda items:

- Statement of incident objectives.
- Situation and resources briefing.
- Strategies to meet objectives.
- Description of tactical operations and tactics:
    - Tactical resource assignments,
    - Resources, support and overhead needs, and
- Finalize, approve and implement Incident Action Plan.

5.2.6 Incident Action Plan

The Incident Action Plan will serve as the operational planning document for the next operational period (usually 24-hrs). It will summarize actions from the last operational period, identify work assignments for the coming day (disposal, surveillance, testing and staging crews), outline medical and incident communication plans, and provide a daily schedule for the next operational period.

The Incident Action Plan is prepared by the Planning Section Chief, with input from the Operations Chief, Disease Management Branch Director, Veterinary Officer, and others as required. A template for the Incident Action Plan to be used for anthrax outbreaks is found in Appendix 10.

5.2.7 Operational Period Briefing (Tactical Briefing)

An operational period briefing will be held at the beginning of each day immediately prior to the start of operational period. A copy of the current Incident Action Plan will be provided to supervisors of tactical resources. The tactical team leaders and crew members will be briefed on the operational elements of the plan to ensure they are aware of their crew assignments, reporting plans, and what is to be accomplished. Crew leaders will have the chance to ask questions about the plan, and get any additional briefings on critical safety issues and additional logistical information.

The meetings will be held at the beginning of the operational period, will be brief (≤ 30 minutes), and will cover the following agenda items:

- Present incident objectives.
- Current assessment of the situation.
- Work assignments and staff for current operational period.
- Updates from technical specialists on response efforts.
- Update from Safety Officer on specific safety risks and mitigation efforts.

5.2.8 ICS Overhead Team Meetings

Depending on the size and complexity of the outbreak, it may be beneficial to hold ICS Overhead Team meetings for planning and communication purposes. Frequency of these meetings (daily, weekly, etc.) will depend on needs of the team and the outbreak, and should be brief. The meetings will be held during the day while tactical response crews are working in the field.

5.2.9 Outbreak Response Monitoring Flights

During an outbreak, key AERP personnel should conduct periodic flights over the outbreak area to assess the status of the outbreak, activities of the field response crews, progress to date, operational issues, and effectiveness of disease control measures. Frequency and timing of these inspection flights will depend on the size, complexity and issues involved in an outbreak. Flights will include some combination of the Incident Commander, Operations Chief, Chief Veterinary Officer, Bison Ecologist and Disease Management Branch Director.

ANTHRAX SURVEILLANCE AND DETECTION (BEFORE AND DURING OUTBREAKS)

6.1 Identification of Conditions Favourable for Outbreaks

The occurrence of anthrax outbreaks is unpredictable. Currently we do not have a good understanding of the exact environmental factors that trigger an outbreak, or what environmental variables and associated thresholds may provide positive predictive capabilities for future outbreaks. Our current approach is to subjectively monitor bison habitat and changes in weather patterns thought to be predisposing for outbreaks. These include:

a) soil and surface moisture (outbreaks can be preceded by a period of high rainfall or flooding);
b) hot, dry weather (outbreaks often occur during prolonged periods of hot, dry weather);
c) mean daily temperature of greater than 15.5°C; and intensive grazing (animals grazing closer to contaminated soil increasing their chances of infection); and
d) anthrax cases in other bison populations, or unusual numbers of cases or distribution in domestic livestock in western provinces and states where anthrax occurs periodically (including Saskatchewan, Manitoba, North Dakota).

Every summer, members the Department's Anthrax Advisory Group (Wildlife Veterinarian, Bison Ecologist, and South Slave Regional Superintendent) will monitor local environmental conditions to identify periods that are favourable for an outbreak. When favourable conditions are identified, routine surveillance should be increased.

6.2 Aerial Surveillance

Routine fixed-wing surveillance flights should be conducted every two weeks over the Slave River Lowlands and Mackenzie bison herd ranges each summer from mid-June to mid-August. This is considered the *anthrax season* when outbreaks have been documented in northern Canada. Dedicated anthrax surveillance flights can be augmented with additional coverage through fixed-wing and rotary aircraft flights used in other wildlife research or fire suppression activity. The Territorial Forest Fire Centre should be made aware of high-risk areas in order that fire patrol crews may watch for dead animals. The detection of anthrax mortalities can be a very difficult task. Factors that reduce the detection rate of carcasses include the large areas involved, surveillance flight coverage, poor visibility of carcasses in forested habitat, low density of bison within the range, and the daily movements of bison.

If carcasses are located, surveillance of the area involved should be intensified, and may be flown with a rotary-winged aircraft. Aircraft used in routine or enhanced surveillance should be equipped with a global positioning system (GPS), and the coordinates of every carcass found should be recorded. Once it is determined that an outbreak is occurring, a helicopter-mounted thermal imaging system can be used in a targeted fashion to assist with detection of carcasses in forested areas. During morning periods, when the sun has not yet substantially warmed the air and background substrate and vegetation, an infrared sensor is able to detect carcasses by the heat of their internal putrefactive processes against the cooler background environmental temperature. Because of variable success in using the thermal imaging system during the 1993, 2000, 2001, 2006, 2010 and 2012 outbreaks, there is a need to formally train personnel, validate the technique and standardize the surveillance protocol.

6.2.1 Routine Surveillance Procedures

1. The Anthrax Advisory Group will recommend a schedule for surveillance flights for the Slave River Lowlands and the Mackenzie bison range each summer (June, July and August).
2. The Bison Ecologist and Wildlife Veterinarian will make arrangements to plan and conduct each surveillance flight, and assign one or two observers to each flight.
3. The Bison Ecologist, Wildlife Veterinarian or local Wildlife Officer will plan the flight route and prepare surveillance forms for the flight.
4. Surveillance flights should be conducted over large open areas, low marshy areas and water edges, and major bison concentrations within the normal bison range. Flights should emphasize but not be restricted to areas of previous outbreaks.
5. Surveillance flights should be conducted at an altitude of 800-1200 ft. (240-360 m) above ground level and an air speed of approximately 100-120 knots. An aircraft with long range, low speed and good visibility should be used (such as a C-185 or C-206). A GPS unit with tracking capability should be taken on each flight so that the actual flight path can be precisely mapped afterwards.
6. Flight planning should be done in advance, and contact shall be maintained with base while in the air throughout the surveillance flight.
7. The observer(s) should watch for any live or dead bison, or animals that are having difficulty walking or otherwise appear sick. The observer(s) should note any live bison, moose, wolves or bears seen during the flight on an Anthrax Surveillance Report form (Appendix 6). If an observer runs out of room on the form, they should continue on a second form or on the back of the form.
8. If a suspected anthrax carcass is located, its GPS location should be recorded on the Anthrax Surveillance Report form. GPS data should be recorded in dd mm.mmm using the WGS84 data file datum.

9. The Wildlife Veterinarian and the Bison Ecologist should be notified immediately of any observed bison carcasses so steps can be taken to collect samples to test for anthrax and to dispose of the carcasses.
10. After each flight, the GPS data from the aircraft should be downloaded and mapped (e.g. OziExplorer, ArcGIS), to recreate the exact flight path and locations of live and dead bison, and determine the percentage of high risk anthrax areas covered.
11. A copy of the Anthrax Surveillance Report (Appendix 6), the GPS data and hard copy map of the flight path should also be sent to the Bison Ecologist in Fort Smith for entry into a digital surveillance data storage file.

6.2.2 Outbreak Surveillance Procedures

1. Enhanced carcass surveillance should be implemented when an outbreak of anthrax is strongly suspected or confirmed.
2. Surveillance flight frequency will depend on the number and rate of new cases expected in order to allow rapid detection and disposal of carcasses to prevent scavenging and environmental contamination with spores. At a minimum, flights should be flown weekly during the outbreak, and not discontinued until the outbreak is over and no new cases are detected. In large or rapidly expanding outbreaks, surveillance should be done more frequently.
3. Surveillance flight coverage area will include all known bison habitat within the affected herd range.
4. Carcass surveillance will be done by fixed wing or rotary-winged aircraft with space for multiple observers. The decision on what aircraft type to use will depend on availability, cost, and the habitat type and visibility of areas being covered.
5. Surveillance aircraft should be equipped with an intercom system for communication among observers, and a GPS to mark and store flight lines covered and live/dead animal locations when they are observed.
6. At each site that a group of live or dead animals are observed, a data point should be stored in the GPS with a unique identifier number and information on what was observed at that site (species, number of animals, live or dead).
7. A digital photograph should be taken from the air at each carcass location. It should be encoded with the date and time, a unique identifier number, GPS coordinates and location description. Photographs should be provided to the Incident Commander for disposal crews to use to relocate the site.
8. In larger outbreaks and outbreaks in heavily wooded areas, surveillance should be done using thermal imaging systems that allow the team to find carcasses in areas where visualization is difficult. Options include the use of a helicopter equipped with a remote gimballed infrared imaging system (e.g. Inframetrics Mark II), or hand held infrared imaging systems used from a helicopter or the ground. Use of systems and operators with training and experience in this application is critical.
9. Surveillance with thermal imaging systems is most effective when the thermal background (ground, rocks and trees) show an even, relatively cool temperature.

On hot days, such conditions generally occur early in the morning and potentially for a shorter time late in the evening. Infrared surveillance is ineffective soon after sunrise. Cloud cover may extend the period suitable for infrared imaging.

10. An Anthrax Surveillance Report form should be filled out during each flight (Appendix 6). If the observer(s) runs out of room on the form, they should continue on a second form or on the back of the form.
11. After each flight the GPS data from the aircraft should be downloaded to a mapping program, such as OziExplorer, to map actual flight path and determine the percentage of habitat covered. A copy of the Anthrax Surveillance Report, digital carcass photos, and flight path map, should be sent to the Bison Ecologist.
12. Carcass locations and descriptive information should be entered into a spread sheet (Microsoft Excel) in a GIS compatible format (ArcView). This should be done on a daily basis. Each update of the spread sheet should be identified with a unique file date that includes the date of updating.

6.2.3 Aerial Surveillance Kit

Sufficient supplies and appropriate field equipment to initiate initial enhanced surveillance during an outbreak should be kept on hand at ENR stations in Fort Smith and Fort Providence at all times. A review of supplies on hand at each station should be performed each spring before the anthrax season to ensure that all supplies required are available.

Each kit should contain:

- Anthrax Surveillance Report form (with extra copies or paper)
- Mechanical pencils
- GPS unit with flight tracking capability
- Digital camera (with spare batteries and memory card)
- 4-way intercom system and headsets in aircraft
- Fluorescent coloured flagging tape
- Permanent fine point black markers
- Carcass sampling kit, optional (Section 7.1.2)

ANTHRAX TESTING AND LABORATORY CONFIRMATION

7.1 Diagnostic Confirmation

A confirmed positive diagnosis of anthrax can only be made by laboratory testing (bacterial culture) of samples collected from a suspect animal. All carcasses found during the anthrax season for which the cause of death cannot be attributed to factors other than anthrax (i.e. drowning, gunshot, goring) should be considered anthrax suspects and samples collected for testing. An initial field test (unofficial) will be conducted immediately on site, and samples will be collected to submit to a diagnostic laboratory. In some cases, sampling bison carcasses may be difficult due to advanced decomposition or dismemberment by scavengers, and turbinate bones will be collected for laboratory testing. Once collected, samples should be sent out to the laboratory (in compliance with Transportation of Dangerous Goods Infectious Substance guidelines) for immediate testing. Once the presence of anthrax has been confirmed in an outbreak area through laboratory testing, no further sampling is required unless there are suspect cases in either a new species or a new geographic area.

After sampling, all carcasses should be treated and disposed of as soon as possible. If a carcass cannot be burned immediately, the carcass should be treated to prevent dismemberment by scavengers. This may be accomplished by dousing the carcass with 10% formaldehyde (Sections 8.5.1 or Section 8.5.2), or by being covered by a staked tarp (Section 8.5.3). The Incident Commander, in consultation with the Chief Veterinary Officer, will identify ENR personnel to conduct sampling of suspect animals. For advice on sampling or handling the carcass, contact the GNWT-ENR Wildlife Veterinarian in Yellowknife at (w): (867) 873-7761 or (c): (867) 445-3230 or Canadian Food Inspection Agency District Veterinarian (Dr. Darcia Nakonechny-Kostiuk) in Edmonton at (w): (780) 495-3298, or Prairie Diagnostic Services (Dr. Musangu Ngeleka) at (w): (306) 966-7250.

7.7.1 Sampling Procedures

1. The Testing Crew should be made up of at least two people. One person will collect samples, and the other will handle clean equipment, set up a wash station, run the field test kit, record data and decontaminate.
2. The Testing Crew will access the carcass to be sampled by either rotary wing aircraft or ground transportation, depending on the location of the carcass and accessibility. GPS locations and descriptive information for the Surveillance Crew will guide the Testing Crew to the site. Pilots should be instructed not to hover over the carcass and to land cross-wind or upwind at least 50 m from any carcass on green vegetation and to avoid landing in bison wallows and areas of bare earth.

3. All pertinent information will be recorded on an Anthrax Carcass Testing and Disposal Report form (Appendix 7).
4. Set up a sampling and disinfection station 10-20 m from the nearest carcass depending on the situation and at least 20 m from the helicopter. Personnel should don and remove protective clothing here as well as decontaminate non-disposable equipment, and package samples and disposable items at this location.
5. Personnel sampling the carcass and working in the "dirty zone" (10-20 m radius around the carcass) should wear full protective clothing as follows:

    a) Put on disposable Tyvek® coveralls with elastic ankle and wrist cuffs and attached hood.
    b) Put on treadless rubber boots or regular rubber boots with Tyvek® disposable boot covers. Place ankle cuffs of coveralls over boot tops and secure with masking or duct tape.
    c) Put on one pair of latex gloves. Cut a hole in the Tyvek® coverall material one inch up from each wrist cuff. Slip thumb through hole to prevent sleeve from riding up during sampling. Put a second pair of gloves on over the first.
    d) Put on an N95 filter mask that covers the worker's nose and mouth.

6. The non-sampling individual should stay in the clean zone, and should never enter the dirty zone. The non-sampling person does not have to wear a mask, Tyvek® suit nor boots, but should wear a double layer of latex gloves. The non-sampling individual should not touch filled sample tubes or other possibly contaminated equipment but should hold open clean plastic bags into which the sampler can place specimens or disposable items. The non-sampling individual should hand out new gloves and sampling equipment to the sampler as required (without coming in direct contact with the sampler), and otherwise assist the sampler in handling of clean equipment. The non-sampling individual should pre-label all sample containers with the carcass identification number, date, and sample type prior to handing over to the sampler.
7. The fresher the carcass the better the chances of recovering *B. anthracis*. Therefore, carcasses should be sampled as soon as possible and samples should be forwarded immediately for testing. If there is more than one carcass involved and sampling materials are limited, samples should be collected from the freshest carcass first.

    a) Collect swabs from the mouth, nose and anus of the carcass.
    b) If there are any fluids oozing from swellings on the carcass, collect a swab at the opening from where the fluid is being discharged.
    c) To take a swab sample, remove the swab from its packaging by the handle being careful not to touch the cotton end. Insert the cotton end into the body opening to be sampled and swab the surfaces of the opening for ten seconds. Remove the swab from the opening and allow it to air-dry for five to ten minutes by sticking the handle of the swab into the soil a few metres

from the carcass. Air-drying stimulates the vegetative bacilli of anthrax to sporulate thereby increasing the chances of a successful diagnosis. Once dried, the sampler will place each swab in an appropriately labelled sample container (screw-capped test tube).

d) With a disposable scalpel carefully make an incision across the bridge of the nose of the animal. Insert a swab into the cut area to collect a sample, and handle the sample as with the orifice swabs described above.
e) If there is any bloody discharge from body orifices onto the soil, a soil sample may be collected and placed in a wide mouth screw-capped jar.
f) In older or dismembered carcasses, a swab from or a piece of the turbinate bones may be collected for laboratory analysis.
g) The sampler should be careful to have as little direct contact with the carcass as possible. If the outer layer of gloves becomes soiled, they should be removed and replaced with clean gloves as soon as convenient. The sampler and non-sampling individual should be careful not to step in any bison or scavenger feces, or any discharge or viscera from the carcass.
h) Under no circumstances should the carcass be opened.

8. When sampling is complete, the sampler will bring the sealed tubes to the clean station. They should be wiped down with 10% (v/v) bleach by the sampler, and dropped into a ziplock plastic bag labelled with the carcass identification number (one bag per carcass sampled) being held open by the clean, non-sampling individual. Once all the samples are in the bag, it should be sealed, wiped down with 10% (v/v) bleach and sealed in a second ziplock bag.

9. Once packaging of the samples is complete, the sampler will return to the wash station and strictly adhere to the following routine to remove his/her protective equipment:

a) Wash any non-disposable equipment at the cleaning stations by scrubbing with a brush to remove any dirt or organic material, spray with a 10% bleach solution, and place small items in a bag held by the "clean" assistant.
b) Remove outside layer of latex gloves, peeling them off so that they turn inside out and place in garbage bag.
c) Remove Tyvek® coveralls, holding them from inside with the "clean" inner latex gloves, and turn the coveralls inside out as they come off. Place them in the garbage bag.
d) If using disposable boot covers, remove by turning them inside out as they come off, leaving the contaminated side covered, and place them in the garbage bag. This is usually done at the same time or just after removing the coveralls.
e) Remove the N95 mask by the straps without handling the front of the mask, and place in garbage bag.
f) Remove final inner layer of latex gloves, peeling them off so that they turn inside out and place in garbage bag.

g) After removing final layer of gloves, personnel are to spray down hands with 10% (v/v) bleach from the garden sprayer then rinse hands with hand sanitizer.
h) The "clean" assistant will spray the boots down with a 10% (v/v) bleach solution using a garden sprayer. If there is dirt embedded in the treads of the boots that will not come off by spraying, a scrub brush should be used to remove all mud before a final spray down.
i) Personnel may continue wearing washed down boots or may store them and switch to personal footwear.
j) Garbage bags containing used disposable clothing and equipment should be sealed and burned on site.

10. Samples should be forwarded as soon as possible, preferably the same day, to the Prairie Diagnostics Laboratory in Saskatoon, SK (see Section 7.1.4).

7.1.2 Sampling Kits

Fully stocked anthrax sampling kits should be kept on hand and ready to go quickly in the event a suspect anthrax case is detected. Sampling kits should be kept on hand in Yellowknife (Wildlife Veterinarian), Fort Smith (Bison Ecologist and Regional Biologist) and Fort Providence (local Renewable Resource Officers). A review should be performed on a regular basis to ensure that all supplies required are available.

Each sample kit should contain (enough for Testing Crew):

- Carcass Testing and Disposal Report Form (Appendix 7) – one per bison
- Box of appropriately sized latex gloves
- Box of N95 masks
- Treadless rubber boots or regular rubber boots with Tyvek® disposable boot covers
- Disposable Tyvek® coveralls with elastic ankle and wrist cuffs and attached hood
- Protective eyewear
- Roll of 2" masking or duct tape
- 10 L water jug (full)
- Wash basin
- Bottle (3 L) of bleach
- Hand-pump pressurized garden sprayer. Just before leaving to sample the carcass a decontaminating solution of 10% (v/v) bleach should be prepared in the sprayer by mixing 1 part bleach with 9 parts water.
- Long handled scrub brush
- Alcohol-based hand sanitizer
- Paper towel
- Sterile swabs (6 per carcass)

- 15 ml sterile polyethylene screw-capped test tubes to hold swabs (6 per bison)
- 50 ml sterile wide-mouth, polyethylene screw-capped sample jars (for environmental samples)
- Disposable scalpels (1 per carcass)
- Permanent fine-tipped black markers
- Large ziplock freezer bags
- Heavy plastic garbage bags
- Bug repellent
- Lighter with ignition materials to light a fire to burn disposable items

7.1.3 Packaging and Shipment of Samples

Transportation of Dangerous Goods Regulations requires that infectious samples are packaged and transported within strict guidelines. The person shipping anthrax samples is responsible for ensuring that the samples are packaged and shipped in compliance with these guidelines. The person must have Transportation of Dangerous Goods certification. Shipping containers that comply with these guidelines should be obtained in advance of an outbreak.

Suitable packaging materials can be obtained from:

Saf-T-Pak, Inc.
17827 – 111 Avenue
Edmonton, AB T5S 2X3
Phone: 1-800-814-7484 or (780) 486-0211
Fax: (780) 486-0235

Website: www.saftpak.com/STPPack/STPackaging.aspx

7.1.4 Preparation and Submission of Samples

1. Sample bags should be wrapped in an absorbent material such as cotton wool, using sufficient quantities to prevent movement and to absorb any spilled material.
2. The bags in cotton wool should be placed in a watertight secondary packaging (i.e. sealed plastic bag).
3. The secondary packaging should be placed within a rigid outer container along with a freezer pack and sufficient packing material to prevent movement. A "rabies can" can be used as the outer receptacle.
4. The outer receptacle is then placed in a shipping box.
5. A completed lab submission form, a copy of the Carcass Disposal Report, and any other correspondence should be placed in an envelope outside of the can and inside the outer shipping box (not inside the can with the sample).
6. The outer box can then be taped shut.

7. Shipment labelling should be duplicated on both the can and the outer box, and should include:

    - Shipper's name, address and phone number
    - Consignee's name, address and phone number
    - UN 3373 diamond shaped label
    - Biological Substance, Category B label
    - TC-125-1B
    - Emergency 24-hour phone number 613-239-4604
    - Box should be marked with the word "Over pack"
    - On the air waybill, use "Biological Substance, Category B" in the description section.

8. Suspect anthrax samples will be tested by the Prairie Diagnostic Services laboratory in Saskatoon, Saskatchewan.

    Dr. Musangu Ngeleka (laboratory diagnostics)
    Prairie Diagnostic Services
    c/o WCVM
    52 Campus Drive
    Saskatoon, SK S7N 5B4
    Phone: 306-966-7250 or 306-966-7316
    Fax: 306-966-2488
    Email: musangu.ngeleka@pds.usask.ca

7.1.5 Anthrax Field Tests

Anthrax is a reportable disease in Canada, and laboratory confirmation by bacterial culture is considered the gold standard to "confirm" the diagnosis. Laboratory testing will be done at Prairie Diagnostic Services in Saskatoon, and any positive results will be provided to the Canadian Food Inspection Agency as the national animal health authority. However, it may take several weeks to get a laboratory result after field sampling because of the time it takes for sample collection, preparation and packaging for shipment, transport to the nearest community with an airport for shipment, laboratory analysis of samples, and time to provide official confirmation for a diagnosis of anthrax.

Ideally, disease control measures should be implemented as soon as possible after detection of a possible anthrax outbreak, and it can take some time to mobilize an ICS team and all necessary supplies to initiate the field response. Delaying the start of field response operations until official confirmation is received from the diagnostic laboratory provides a greater window of opportunity for additional cases to occur and scavengers to open carcasses and release spores into the environment.

A simple diagnostic field test is available for use with suspect carcasses and is described below. This test does not supersede or replace the need or requirement for official laboratory confirmation, but may be used to provide additional immediate evidence that the observed animal deaths are due to anthrax. Such evidence may assist Senior Management in justifying the initiation of immediate response operations in advance of a diagnosis from the federal laboratory.

It is important to note that putrefactive processes in the carcass and environmental factors may interfere with the sensitivity of the tests and cause false negative results (i.e. test results indicate that no anthrax is present when in fact the animal did die of the disease). Thus, while positive results in either test are indicative of anthrax as the cause of death, negative results do not discount the possibility of anthrax. Therefore, negative results are more accurately interpreted as inconclusive and should not be used as evidence that anthrax is not present.

7.1.5.1 Hand-held Anthrax Protective Antigen Immunoassay

Many of the symptoms of anthrax are caused by a toxin produced by *B. anthracis*. Protective antigen is a component of this unique toxin and is the target of this hand-held assay system that operates on the same principles as a home pregnancy test. Demonstration of protective antigen in a carcass with this assay is highly indicative of anthrax.

Success of the hand-held assay is dependent on the approximate age of the carcass. The test may not be effective in animals that have been dead less than eight-hrs. as cellular breakdown may not have released sufficient protective antigen into the circulatory and lymph systems in this time. The test may also not be effective for extremely old carcasses as putrefactive processes may have degraded any protective antigen present.

The hand-held test may be run with any of the sample types collected for submission to the federal laboratory. A separate swab is used for this assay, and can be swabbed in multiple orifices/areas of discharge (particularly those that have evidence of blood) to maximize the changes of detecting a positive animal. Environmental samples of body fluid soaked soil are not compatible with the assay.

Steps in using the field assay:

- The field sampler, wearing protective gear, samples the carcass by using the swab provided in the test kit. The swab can used to sample multiple sites, including the nose, anus, cut across the bridge of the nose, and body fluid discharges.

- The sampler places the swab in the test vial (being held by the "clean" assistant) and breaks off the tip so it drops into the vial. The remaining piece of the swab handle is disposed of in a garbage bag.
- The assistant puts the lid on the vial, shakes it up and lets it sit for five minutes.
- After five minutes, five drops are placed into the first well on the test kit.
- The test is very time sensitive, and should be read exactly 15 minutes after the drops are placed in the kit.

Test Interpretation:

- Read test at exactly 15 minutes after start of test to avoid false negatives or false positives.
- Pink line appears in Control (C) well, pink line appears in Test (T) well.
  - Sample is positive for the presence of protective antigen and anthrax.
- Pink line appears in C well but no line appears in T well.
  - C well result verifies the hand-held assay is functional and negative result in T well indicates the test was negative for anthrax.
- No line appears in C well but pink line appears in T well.
  - Indicates the sample applied to the hand-held assay may have been too concentrated. Dilute sample 1-in-10 in water or phosphate-buffered saline and retest on a second ticket.
- No line appears in C well, no line appears in T well.
  - Indicates the reagents in the hand-held assay have degraded and assay has expired. Test is inconclusive. If possible, retest the sample with an assay from a different manufacturing lot.

7.1.5.2 Geimsa Stain with Microscopy Analysis

This procedure allows for the production of a sterilized blood smear on a microscope slide which can then be stained and observed for the presence of bacteria with an appearance consistent with *B. anthracis*. This test is not routinely performed, but may be used by qualified and designated personnel if other field tests are not available.

Extra equipment to take into the field:

- Glass microscope slides with frosted end
- Wax pencil
- Dry swabs
- Staining jar with water tight screw-capped lid, plastic
- 500 ml bottle of formalin
- Ziplock plastic bag to fit staining jar

Extra equipment required for staining in the laboratory:

- Staining rack
- 500 ml bottle Geimsa stain
- 500 ml bottle phosphate buffer, 0.001 M, pH 7.0
- 50 ml bottle slide glue
- Box microscope slide coverslips
- 50 ml bottle microscope immersion oil
- light microscope with a 10x body ocular and 100x oil emersion lens (total magnification 1000x)

1. Use the wax pencil to label the frosted end of a microscope slide with the date and identification number for the carcass.
2. The best candidate to make the smear with is blood from the incision made across the bridge of the animal's nose. Place a dry swab into the incision. Orientate the labelled microscope slide with its frosted end to your left. Use the swab to transfer a large drop of blood to the slide just to the right of its frosted end.
3. Take a second microscope slide, orientated perpendicular to the first slide and on edge. Place the edge of the second slide just to the left of the blood drop on the first slide and drag it to the right over the surface of the first slide in order to smear the blood across the first slide.
4. Set the slide on the ground and leave for 10 to 15 minutes to air dry. Change outer gloves or rinse thoroughly with 10% (v/v) bleach.
5. Place the slide in the staining jar and fill jar with formalin. Also place the microscope slide used to smear the blood across the first slide into the staining jar for decontamination. Seal jar and place in a zip lock plastic bag for transport back to the laboratory. Staining and visualization of the slide smear should be conducted within 12 hrs. of immersion of the slide in formalin.
6. Treatment with formalin for greater than 30 minutes will inactivate any *B. anthracis* vegetative cells or spores present in the blood smear however care should still be taken and gloves should be worn when handling the fixed slide.
7. Back at the laboratory, remove the slide from the staining jar, place on a staining rack over the sink and flood with Geimsa stain.
8. Leave the Geimsa stain in place until almost dry (10 to 15 minutes) then rinse the stain off with tap water followed by phosphate buffer. Gently blot the slide dry with paper towel.
9. Place a drop of slide glue on the smear followed by a coverslip. Leave the slide for 15 to 20 minutes to allow the glue to dry.
10. View the slide under a light microscope with an oil emersion lens at 1000x magnification. If present in the blood smear, *B. anthracis* will appear as chains of blue rectangular microbe cells surrounded by a purple capsule. Any spores present will appear as circles of negative staining (i.e. white) located within the blue vegetative cells. Because of the spiky appearance of the capsule around the vegetative cells, Geimsa stained *B. anthracis* vegetative cells are sometimes described as "fuzzy caterpillars".
11. While the presence of "fuzzy caterpillars" in the blood smear is highly suggestive of anthrax, their absence in the smear does not discount that the animal may still have died of anthrax. Putrefactive processes within the carcass may have cleared

B. anthracis vegetative cells out of the blood or the cells may have washed off the slide if it was immersed in the formalin before being completely dry.

CARCASS TREATMENT AND DISPOSAL

8.1 Implementation of Carcass Treatment and Disposal Operations

Upon confirmation of anthrax by field or laboratory testing, or when there is sufficient field information to suggest an anthrax outbreak is occurring, the Incident Commander will give direction to begin carcass disposal operations.

When an anthrax carcass is located, it should be sampled, if required, and disposed of as soon as possible. The standard protocol that must be used for disposal of anthrax cases is to burn the carcass as outlined in Section 8.5.4. Some modifications to the protocol may be necessary depending of the accessibility of the site, condition of the carcass, availability of fuel sources and supplies, and forest fire risk. These decisions will be made by the Disease Management Branch Director, ensuring any protocol modification still results in effective disease control.

Carcasses should not be moved from the location where found under any circumstances, and should be treated as soon as possible. Each carcass is the source of an extremely high number of *B. anthracis* organisms, and every effort should be made to prevent contamination of the environment and exposure of people or animals. That is the basis of the disease control measure recommendations not to move a carcass, to prevent any opening or scavenging, and to treat the carcass and site as soon as possible. Moving a carcass, no matter how carefully done, can't help but disseminate spores and contaminate additional places, the environment and equipment.

If the carcass cannot be disposed of promptly, it should be immediately treated with formaldehyde to prevent scavenging and release of spores (as outlined in Sections 8.5.1 and 8.5.2). Alternatively, the carcass may be covered by a tarp which is then staked to the ground to help prevent scavenging. By keeping the carcass as intact as possible until it is incinerated, this may decrease the release and spread of anthrax spores at and around the site.

After the index case has been confirmed as anthrax, all suspected carcasses in the same general area should be assumed to have died of anthrax as well. Carcasses should not be moved and should be incinerated on site, except in exceptional circumstances upon the advice of the Chief Veterinary officer or Disease Management Branch Director. This will minimize the release and spread of anthrax spores into the environment. The carcass and the soil immediately surrounding it must be incinerated completely as soon as possible. Once a complete incineration is achieved (which may take multiple burns), the site should be decontaminated with 10% formaldehyde

solution. The concentration of spores in the local environment will increase dramatically if infected carcasses are not treated and incinerated, and this may result in an increase in the risk or magnitude of future outbreaks.

One or more Carcass Disposal Crews will be tasked to deal with carcasses which have already been identified and recorded, information collected, and sampled for testing if necessary. The daily Incident Action Plan will provide each Crew with goals and objectives for the day, a list of carcasses to dispose of, and the materials, supplies and aircraft required to complete their task.

Separate crews should be deployed to cut wood, working in sites selected by the Incident Commander that are remote from any anthrax cases. Cutting crew should cut firewood in appropriate lengths: ~8 ft. lengths for dry wood, and ~6 foot lengths of green wood. Where possible, aspen is best for green wood as it does not tear disposable boot covers worn by disposal crews. Approximately 1,360 kg (3,000 lbs.) of dried wood and 8-10 large green logs should be delivered to each carcass. Depending on the size of the carcass and degree of scavenging, ~20 bags of coal (22 kg or 50 lbs./bag) should also be used for each site. Fuel wood and coal should be slung to a drop site at least 50 m from each carcass.

8.2 Personnel Safety

Personnel involved in carcass disposal operations must be adequately protected from exposure to infectious material and anthrax spores. It is essential that proper PPE be worn at all times when working around infected carcasses, and disposable protective clothing be burned after sampling or treating each carcass. Safety and operational procedures outlined in the AERP must be followed carefully and exactly. Carcass Disposal Crews must also take every precaution to avoid the dissemination of infectious materials on contaminated clothing and equipment, including helicopters.

Anthrax vaccination will be arranged by GNWT H&SS for ENR response personnel who will be involved in the sampling or clean-up operations if a prolonged outbreak is anticipated, or if they may be working on anthrax surveillance, testing, response or research over multiple years.

Personnel who handle formaldehyde should wear protective equipment including a heavy-duty rain suit, rubber gloves, rubber boots, eye protection and a formaldehyde rated mask (as described in Section 8.5.2). Each individual should receive instructions in use of the mask, and conduct a fit test (using a certified test ampule) to ensure the mask is working appropriately. Containers holding formaldehyde should be clearly

marked with a poison symbol. Drinking water containers should also be clearly labelled and not used for toxic or noxious liquids.

Personnel who are involved in carcass testing or disposal should wear full protective clothing include rubber boots, Tyvek® suits, double layers of gloves, eye protection and N95 masks (as described in Section 8.5.3). Each individual using N95 masks should use the N95 Respirator On and Off Protocol recommended by GNWT H&SS (Appendix 11).

Wood cutting crews will comprised trained firefighters or initial attack crews and will have the required safety training and field gear. As wood cutting crews will not be working in proximity to infected carcasses, full PPE and pre-outbreak vaccination is not required.

8.3 Equipment and Supplies

Equipment requirements for the detection and disposal of anthrax carcasses can be quite extensive during large outbreaks. The disposal procedures will utilize some equipment that is normally maintained for the routine operation of the Department. Protective clothing and other supplies should be kept in stock for immediate response to the initial cases in an outbreak. The Logistics Section Chief will be responsible for arranging for the acquisition of additional supplies and equipment to meet operational requirements.

Formaldehyde Mixing Equipment for Helicopter Sling Basket

- 100-gal. foam bucket with injection sack and remotely controlled pump
- 100-foot long line
- Heavy duty rain suit
- Rubber boots
- Heavy duty rubber gloves
- Eye Protection
- Formaldehyde rated respirator
- Eye wash (pre-filled with water)
- Portable shower bag with minimum 5-gal. capacity (pre-filled with water)
- Garbage bags to bag unwashed clothing
- Concentrated formaldehyde (10 gal./carcass)
- Hand wobble pump for pumping formaldehyde
- Drinking water and Gatorade
- Insect repellent
- Radio for communications between crews and with transport

Formaldehyde Application with Back-Pack Sprayers (two person crew)

- Treadless rubber boots or rubber boots with disposable Tyvek® boot covers
- Heavy-duty rubber gloves
- Box of appropriately sized latex gloves
- Tyvek® coveralls with integral hood
- 2-inch masking tape
- Protective eyewear
- Formaldehyde rated respirator mask with new filters for each carcass
- Heavy duty garbage bags
- Bleach
- Long handled scrub brush
- Hand-pump pressurized garden sprayer with 10% (v/v) bleach solution
- Hand-pump back-pack garden sprayers (20 L capacity) for formaldehyde
- Water containers (4 x 25 L)
- Formaldehyde (40% w/v formaldehyde): 3 X 3.75 L each
- Alcohol-based hand sanitizer
- Insect repellent
- Radios for communications between crews and with transport
- Drinking water and powdered Gatorade (clearly marked)
- Bear deterrents

Carcass Disposal Crew Equipment

- Axe
- Hand-crank winch ("Come-along"), with land anchor
- Roll of 3/8-inch nylon rope, or larger
- 20 L of diesel or turbo fuel per carcass
- Matches or lighter for staring pyre
- 22 kg. (50 lb.) bags of coal (20 bags per carcass)
- Appropriately sized latex gloves for all team members (1 box each)
- Box of appropriately sized leather work gloves (to go over latex gloves)
- Treadless rubber boots or regular boots with disposable Tyvek® boot covers
- Tyvek® coveralls with integral hood (appropriate sizes for crew members)
- 2-inch masking or duct tape
- Suitable eye protection (safety glasses/goggles)
- Disposable N95 particulate masks
- Heavy duty plastic garbage bags
- 20 L of human-use disinfectant (10% bleach solution)
- Hand-pump pressure sprayer to apply disinfectant
- Alcohol-based hand sanitizer
- Large ziplock freezer bags
- Drinking water and Gatorade (clearly marked)
- Insect repellent

- Radios for communications between crews and with transport
- Bear deterrents

8.4 Securing Carcass Sites

If an anthrax carcass is located in an area that is readily accessible to the general public, measures should be taken to restrict access to the site and prevent direct exposure to the carcass.

- For carcasses in open areas, bright fluorescent spray paint can be used to make a visual perimeter line in a circle 20 m around the carcass. This will separate the "clean" zone from the "dirty" zone where only response crew in full PPE should be allowed to go. Alternatively, bright plastic emergency road cones can be used to create an outer perimeter line.
- For carcasses in wooded areas, bright flagging or barrier tape can be attached to trees or stakes to create a protective barrier approximately 20 m around the carcass.

8.5 Carcass Treatment and Disposals Protocols

8.5.1 Chemical Treatment of Carcasses with Helicopter Bucket Sling

If a carcass cannot be disposed of promptly, it should be chemically treated with formaldehyde before burning. If a carcass is not treated before burning, the site should be decontaminated by chemical treatment after burning.

1. Select a site with an ample supply of water deep enough for dipping foam bucket.
2. One person should be responsible for handling the formaldehyde.
3. Protective rain gear, full-face mask and gloves should be worn while handling the chemical. Pre-filled eyewash and shower should be on hand in the event of exposure to formaldehyde.
4. Pump 40 L (10 gal.) of formaldehyde into the foam sack of the bucket.
5. Sling the bucket using a long line (minimum 30 m or 100 ft.) and fill it with 300-340 L (80-90 gal.) of water (paying attention to helicopter load limitations).
6. Inject the 40 L (10 gal.) of formaldehyde, and drench the carcass by releasing the solution from a height of less than 4 m.
7. Protective gear worn by the mixer should be rinsed off with water or packaged in a plastic bag for washing later at base.
8. The bucket and any other equipment exposed to formaldehyde should be thoroughly rinsed after use.

8.5.2 Chemical Treatment of Carcasses with Backpack Sprayer

1. Formaldehyde treatment of the carcass via this method will require at least two people. The formaldehyde crew must wear full protective clothing at all times when within 25 m of any carcass. Personnel must be fully instructed on the proper use of protective clothing before dispatch. Disposal crew personnel should wear full protective clothing as follows:
    a) Put on disposable Tyvek® coveralls with elastic ankle and wrist cuffs and attached hood.
    b) Put on treadless rubber boots or regular rubber boots with Tyvek® disposable boot covers. Place ankle cuffs of coveralls over boot tops and secure with masking tape.
    c) Put on one pair of latex gloves. Cut a hole in the coverall material one inch from each wrist cuff. Slip thumb through hole to prevent sleeve from riding up during sampling. Put a second pair of heavy-duty rubber gloves on over the latex gloves.
    d) Put on suitable masks and eyewear suitable for chemical protection.
2. Once dressed in protective gear, each person should empty one container of formalin into a back-pack sprayer reservoir then fill the reservoir to the 20 L mark with water (this dilution will give a working concentration of formaldehyde of 7.5%).
3. Seal the sprayer and sling on back. Approach the carcass site being careful not to step in any carcass material or scavenger feces. Spray as much of the surface area of the material as possible but do not try to turn or kick material over to treat its underside.
4. Working from the perimeter of the site inward, work the pump of the sprayer and spray down all carcass material and scavenger feces present with formaldehyde.
5. Once site has been treated, personnel should move over to the decontamination line and remove their personal protective equipment as directed below. Disposable equipment should be collected and sealed in a garbage bag. Garbage bags of waste should be burned at the end of the day.
    a) If using disposable boot covers remove by turning them inside out as they come off, leaving the contaminated side covered, and place in a garbage bag. Wash boots down with bleach solution (10% v/v) using the scrub brush to remove all mud and dirt from the treads, and then rinse boots and brush with water.
    b) Scrub down heavy rubber gloves with bleach solution and rinse with water. Allow gloves to air-dry then seal in a large ziplock bag.
    c) Remove Tyvek® coveralls, again turning them inside out as they come off and place in garbage bag.
    d) Remove N95 mask by the straps without handling the front of the mask, which may be contaminated.
    e) Remove final inner layer of latex gloves, peeling them off so that they turn inside out and place in garbage bag.

f) After removing final layer of gloves, personnel are to spray down hands with 10% (v/v) bleach from the garden sprayer then rinse hands with hand sanitizer and water.
g) Personnel may continue wearing washed down boots or may store them and switch to personal footwear.

6. A Carcass Testing and Disposal Report Form (Appendix 7) must be completed for each carcass.

8.5.3 Tarping Carcasses

If a carcass cannot be disposed of promptly, it can also be covered with a tarp to prevent scavenging until the carcass can be burned as outlined in Section 8.5.4. Tarping is currently not considered adequate on its own to treat a carcass for complete disinfection of the site.

The carcass can be covered with a tarp that is sufficient in size to cover the carcass and contaminated soil at the site, and staked down at the corners with enough metal spikes to ensure the tarp is not blown off. When crews are available to burn the carcass, the spikes should be removed (and disinfected) and the tarp should be burned along with the carcass.

8.5.4 Burning of Carcasses – Standard Protocol

Carcasses should not be moved from the location where found under any circumstances, and should be treated as soon as possible. It is okay to flip the carcass over as part of the burning process described below, but the carcass should not be moved from the site.

1. The Incident Commander should notify the Territorial Forest Fire Centre in advance of any carcass incinerations so that they may have personnel on standby in case the fire gets out of control. The Incident Commander should arrange to have a burn permit issued prior to the incineration of carcasses.
2. A two to five person Carcass Disposal Crew and all required equipment will be mobilized by helicopter to the carcass site. Pilots should be instructed not to hover over the carcass and to land upwind at least 50 m from any carcass and on green vegetation avoiding bison wallows and areas of bare earth.
3. The Carcass Disposal Crew should establish a cleaning and decontamination site at least 20 m away from the carcass in an area that is vegetated with no occurrence of scavenger scat or trails that lead to the carcass. This site will be used for donning protective gear before working on the carcass, and will then be used for removal of protective gear and decontamination once the carcass pyre has been ignited.
4. To help visualize and maintain the "clean" and "dirty" zones used in the carcass disposal protocol, a visual perimeter line can be made 20 m around the carcass using a bright fluorescent spray paint when in open areas. In wooded areas,

bright flagging or barrier tape can be attached to trees or stakes to create a protective barrier around the carcass. For carcasses found in areas with access by the public (roads, communities, etc.), bright plastic emergency cones can be used to create the perimeter line.

5. Disposal procedures will often occur in considerable heat, and sufficient fluids should be on hand to prevent heat stress or dehydration of personnel. The use of a commercial preparation (i.e. Gatorade) will replace essential body electrolytes lost due to severe heat and work.
6. The Carcass Disposal Crew must wear full protective clothing at all times when sampling a carcass or working within 20 m of any carcass. Personnel must be fully instructed on the proper use of protective clothing before dispatch. Disposal crew personnel should wear full protective clothing as follows:
    a. Put on disposable Tyvek® coveralls with elastic ankle and wrist cuffs and attached hood. Long sleeved shirt and trousers, or coveralls, are to be worn under Tyvek® coveralls as an added layer of protection in case the Tyvek® is damaged.
    b. Put on treadless rubber boots or regular rubber boots with Tyvek® disposable boot covers. Place ankle cuffs of coveralls over boot tops and secure with masking tape.
    c. Put on one pair of latex gloves. Cut a hole in the Tyvek® coverall material one inch from each wrist cuff. Slip thumb through hole to prevent sleeve from riding up during sampling. Put a second pair of latex gloves on over the latex gloves.
    d. When carrying wood and coal, put a pair of leather work gloves over top of both latex glove layers.
    e. Put on a N95 mask and protective eyewear.
7. Two people within the Carcass Disposal Crew can be designated to transport wood and coal from the drop site to within 5 m of the carcass site, where the fuel will then be received by the two crew members in full protective gear, and positioned at the carcass site. The two people that are hauling wood and coal are required to wear rubber boots, leather gloves, coveralls, and N95 particulate masks.
8. It is important to try and elevate the carcass sufficiently so that there is airflow beneath the carcass that facilitates effective incineration. In the absence of airflow, solid fuel placed on top of a carcass will usually fail to completely incinerate the carcass mass.
9. Green wood is used to create a platform the carcass can be rolled over onto. Where possible, aspen is best for the green wood as it does not tear disposable boot covers worn by the disposal crews.
10. Six foot lengths of larger green wood spaced 30-50 cm apart should be laid perpendicular to the backbone of the carcass. The end of the green logs should be within 20 cm of the backbone of the carcass.
11. Depending on the size of the carcass, ~15 bags of coal should be laid down between the green logs to form a bed. Once in place, the coal bags should be sliced open with a carpet knife and then doused with ~5 L of diesel fuel.

12. The anchor for the hand-winch should be sunk in to the soil *ca.* 3-5 m beyond the far edge of the green wood and coal bed. Once the winch is attached to the anchor, cut a 10 m length of cord and with a 'clean' person holding the middle of the cord, a 'dirty' worker should lift the ends of the cord over the carcass and secure them to the front and hind leg closest to the ground. The cord should be secured on each leg between the top of the leg and elbow or knee.
13. Once the ends of the cord are secured to the animal, the middle portion of the cord (which should not have come into contact with the carcass) should be secured to the winch cable/line. The hand-winch is then used to slowly turn the carcass over on to its back, and then rolled on top of the primary fuel bed of green wood and coal. Once the carcass is rolled, the cord is detached from the hand-winch and placed onto the carcass. A clean person should dismantle the winch and pull the anchor out of the ground. At the decontamination site, the anchor should be cleaned of any soil or mud using a scrub brush and 10% (v/v) bleach from the garden sprayer.
14. Depending on the size and orientation of the carcass on the green wood and coal bed, more bags of coal may be positioned at the sides of the carcass to ensure the entire carcass is over a source of coal.
15. Up to five bags of coal should be opened and spread onto the original carcass bed, which will be saturated with body fluids from the carcass. A layer of dry wood should be placed on top of the coal and completely cover the original carcass bed. This prevents personnel from becoming contaminated by stepping in body fluids and sloughed hair.
16. Any parts of the carcass removed and dragged off by scavengers must also be placed with the carcass for incineration. Large pieces may be carefully dragged back to the main carcass with a length of ¼" cord. Once tied to the piece of carcass, do not untie the cord but cremate it with the carcass. Take care to minimize contact with the carcass piece while attaching the rope.
17. Stack wood around and on top of the carcass in an orientation parallel to the carcass. Place logs close together in a dense stack to maximize the length of time the wood burns. Stack more wood at the head and rump of the carcass. When complete the carcass should be completely covered by dry wood. Pour the remaining diesel fuel over the dry wood.
18. During rest periods, only masks and gloves should be removed, and these should be stored in such a way as to prevent contamination of each other. Once the gloves have been removed personnel should rinse hands with alcohol-based hand sanitizer and be careful to keep their hands off the outside of the coveralls.
19. Personnel should move over to the decontamination line and remove their personal protective equipment as directed below. One person should remain on the carcass side of the decontamination line and transfer the discarded personal protective equipment onto the carcass.
20. Once everyone else has completed their decontamination, the person remaining on the carcass side should remove their PPE, throw it on the pyre, and light it.
21. Once the pyre is lit the disposal crew should return to the wash station and strictly adhere to the following routine to remove their protective equipment:

a. If using disposable boot covers remove by turning them inside out as they come off, leaving the contaminated side covered, and place in a garbage bag. Wash boots down with bleach solution (Javex dilution: 1 part Javex to 10 parts water) using the scrub brush to remove all mud and dirt from the treads, and then rinse boots and brush with water.
b. Scrub down heavy rubber gloves with bleach solution and rinse with water. Allow gloves to air-dry then seal in a large ziplock bag.
c. Remove Tyvek® coveralls, again turning them inside out as they come off and place in garbage bag.
d. Remove mask by the straps without handling the front of the mask, which may be contaminated.
e. Remove final inner layer of latex gloves, peeling them off so that they turn inside out and place in garbage bag.
f. Personnel may continue wearing washed down boots or may store them and switch to personal footwear.
g. Garbage bags containing used disposable clothing and equipment should be sealed and thrown onto the burning pyre. Care should be taken by the person throwing the bag onto the pyre not to step into any feces or mud around the carcass site.

22. All disposal personnel will carefully wash both hands and face with an approved human-use disinfectant.
23. All disposal crew personnel must shower and wash their hair immediately upon returning to town following carcass disposal activities. Potentially contaminated clothing should be machine-washed separately from street clothes.
24. Disposal crews will be instructed to use care in working around a carcass, and advised not to touch the carcass with hands or clothing.
25. An Anthrax Carcass Testing and Disposal Report Form (Appendix 7) must be completed for each carcass.
26. After burning is complete (>24-48 hrs. after burning), the ash bed and the surrounding ground surface should be decontaminated with 10% formaldehyde.

8.5.5 Burning of Decomposed Carcasses – Modified "Wedge" Protocol

In some cases, carcasses may be in an advanced stage of decomposition that makes the standard protocol for putting wood and coal under the carcass (Section 8.5.4 steps 8-10) impossible. In these cases, a modified protocol for fuel placement can be used. This technique is demonstrated in Chapter 7 of the ENR training video entitled "*Dealing with an anthrax outbreak*".

The field disposal crew can use aslender log or pole wedged under the carcass to elevate it partially and place coal underneath the elevated section. The crew will work their way around the entire carcass placing coal as each section is elevated. Care should be taken to always keep the end of the pole that has touched the carcass in the "dirty" area and not let it touch an personnel, equipment or any areas in the "clean"

zone. Following placement of coal under the carcass, the pole is to be placed on top of the carcass as part of the burning fuel. All other steps in the standard burning protocol (Section 8.5.4) are to be followed.

8.5.5 Disposing of Carcasses found in Water

If a carcass is found in water, standard carcass treatment and disposal protocols may not be possible. A decision on how to deal with these carcasses will be made on a case-by-case basis by the Incident Commander, Operations Chief and Disease Management Branch Director after consultation with the Chief Veterinary Officer.

8.6 Decontamination of Equipment and Supplies

Any equipment and supplies that are used in the "dirty zone" around a carcass (within a circle 20 m around the carcass on all sides) must either be disposed of with the carcass (incinerated) or disinfected before it is brought out of the "dirty zone". For non-disposable equipment, wherever possible select items made of materials that are easy to wash and disinfect (metal, plastic, rubber, etc.) and avoid non-disposable items made of wood or cloth. When leaving the "dirty zone", wash down equipment as described in Section 8.5.4. The key to proper cleaning and disinfection is to completely remove all soil and biological matter from the equipment, and then disinfect with either 10% bleach or 10% formaldehyde solution.

When dealing with larger mobile equipment (e.g. ATVs, trailers), every effort should be made not to drive the mobile equipment directly into the "dirty zone" around a carcass, but rather stay at the perimeter outside of this zone. If the equipment has to go into or through a "dirty zone", it must be disinfected as described in the section above each time it leaves a "dirty zone". When the mobile equipment is going to leave a specific outbreak response area (to move to another area or at the end of the outbreak), it must go through a complete cleaning and disinfection before it is moved even if it did not go in any "dirty zones". Under no circumstances can mobile equipment movement be moved prior to cleaning and disinfection in the field.

YEARLY REVIEW OF THE ANTHRAX EMERGENCY RESPONSE PLAN

Regardless of whether or not there was an outbreak in the jurisdiction of the GNWT, the Anthrax Advisory Group will hold a yearly review of anthrax response operations to ensure they remain current, effective and efficient. The review should be conducted in late autumn or early winter after the summer "anthrax season." The results of the review should be written up so that they may be consulted by future Anthrax Advisory Groups.

For years in which no anthrax outbreak was observed, the review should include the following:

1. A summary report of all surveillance flights flown for the year including estimates of habitat and herd coverage for each flight.
2. An assessment of weather and environmental conditions for the historical endemic regions to determine whether or not conditions were favourable for an outbreak.
3. An inventory of PPE, sampling and testing supplies, and carcass treatment and disposal equipment (should have enough for at least 25 cases). An inventory should also include a check of equipment used in carcass treatment and disposal to ensure it is maintained and functioning properly.
4. A review of personnel training and experience in regards to anthrax response operations. The Anthrax Advisory Group should ensure there are personnel on staff with current Transportation of Dangerous Goods certification and training in surveillance techniques, use of safety apparel, carcass sampling, field test use, and carcass treatment and disposal techniques. If not, the Anthrax Advisory Group should arrange training programs to develop and maintain the necessary professional skills. The Anthrax Advisory Group should also arrange for anthrax vaccinations at the time of the review, if requested, for long-term employees who would be involved in future outbreaks.
5. Progress reports on anthrax research projects. The Anthrax Advisory Group should discuss whether the GNWT can do anything to facilitate the continuation and completion of the projects, and identify any future research projects that could be initiated.
6. A review and revision of the AERP to incorporate any new pertinent anthrax research and to update contact information.

For years in which an anthrax outbreak did occur, the review should also include:

1. A summary and timeline of the outbreak and response operations, including a summary of total cases found, locations, age/sex composition of the outbreak, other epidemiological information, field response, any operational issues encountered, and a breakdown of response costing.
2. An evaluation of the AERP with particular emphasis on the efficiency of response actions, organizational arrangements, group coordination, and communications

arrangements. Any improvement to the plan identified during the evaluation should be immediately incorporated.

3. A review of public and media relations during the outbreak to determine if information and awareness programs were timely and sufficient. Any public complaints or concerns over the response operations should be addressed.
4. A review of funding arrangements for the response operations and subsequent recovery actions.

RECOMMENDED RESOURCE MATERIAL

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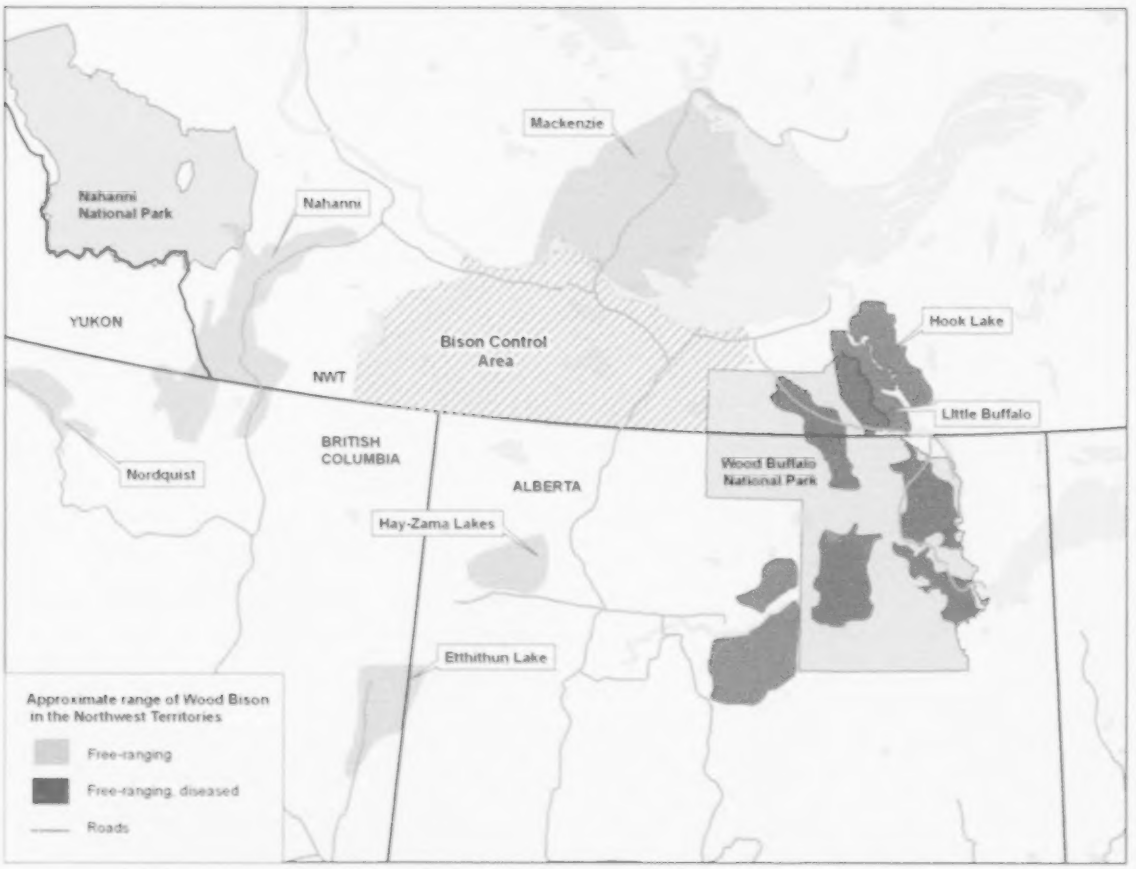
APPENDIX 1. Anthrax endemic regions in northern Canada.



APPENDIX 2. Anthrax outbreaks in the Slave River Lowlands, Wood Buffalo National Park (WBNP) and Mackenzie bison populations, 1962-2012.

Number of carcasses found

Year	Slave River Lowlands	WBNP	Mackenzie Bison Range	Total
1962	281			281
1963	257	47		304
1964	303	60		363
1967		120		120
1968		1		1
1971	33			33
1978	39	47		86
1991		32		32
1993			172	172
2000		106		106
2001	12	91		103
2006	26	3		29
2007		64		64
2010	46	7	9	62
2012			440	440

APPENDIX 3. Anthrax Media Advisory

Media Advisory

Anthrax Outbreak in the Northwest Territories

YELLOWKNIFE (date) – The Department of Environment and Natural Resources has confirmed the presence of anthrax in _____ bison found dead in _____ area.

Anthrax control measures are now in effect. Routine aerial surveillance flights are being conducted to detect any other infected animals.

Rapid detection and disposal of dead bison will minimize the release of anthrax spores into the soil. Dead bison will be burned and the site will be treated with a chemical disinfectant.

The public is advised to use caution if required to travel in this area.

For more information, contact:

Judy McLinton
Communications Planning Specialist
Environment and Natural Resources
Yellowknife, NT.
Tel: (867) 873-7379

APPENDIX 4. Anthrax Public Information Summary (on website)

Northwest Territories Environment and Natural Resources

Anthrax in the Northwest Territories

Anthrax is a disease caused by the bacteria *Bacillus anthracis*. Once introduced into an area, anthrax spores can remain viable in the soil for many years.

Under certain environmental conditions, such as wet conditions followed by hot dry weather, the spores become concentrated in low-lying areas. Bison usually contract the disease by inhaling contaminated soil during vigorous wallowing in dust baths.

Symptoms of Anthrax in Bison

- A diseased bison may appear depressed or indifferent to people. It may have a frothy discharge from the nostrils, and swellings in various parts of the body. Walking can be difficult, and bison may stagger or have stiffed-legged gait. Infected bison usually die within 72-hours and are unable to travel very far from the area where they were infected.
- Carcasses typically lie on their side in a sawhorse position and are severely bloated. Rigor mortis (stiffness) is sometimes absent and the carcass will decompose faster than normal. Anthrax is not normally spread from animal to animal.
- People are advised not to approach or touch the carcass.

Public Health Concerns

- Humans can contract anthrax from contact with infected animals or carcasses.
- Anthrax can cause skin, respiratory or intestinal infection in humans. Skin infections are the most commonly seen form in people and cause dark pustules on the skin. Anthrax infections can be fatal but can be controlled if promptly treated with antibiotics.

Previous Anthrax Outbreaks in the Northwest Territories:

- Between 1962 and 2012, there have been eight documented outbreaks in the Slave River Lowlands and ten in Wood Buffalo National Park

Anyone who may have been exposed to anthrax should contact local public health officials immediately.

APPENDIX 5. Anthrax Contact List

Canadian Food Inspection Agency

Dr. Darcia Nakonechny-Kostiuk (district vet for NWT and main contact)
District Veterinarian
Canadian Food Inspection Agency
Edmonton Regional Office – Animal Health
J.G. O'Donoghue Building, Room 205
7000 113 Street
Edmonton, AB T6H 5T6
Phone: 780-495-3298
Fax: 780-495-3359
Email: Darcia.nakonechny-kostiuk@inspection.gc.ca

Dr. Kim Knight-Picketts (CFIA senior advisor on anthrax)
Veterinarian, Animal Health Program Specialist
Canadian Food Inspection Agency
Phone: 902-368-0950 ext. 258
Email: kim.knight-picketts@inspection.gc.ca

Prairie Diagnostic Services

Dr. Musangu Ngeleka (laboratory diagnostics)
Prairie Diagnostic Services
c/o WCVM
52 Campus Drive
Saskatoon, SK S7N 5B4
Phone: 306-966-7250 or 306-966-7316
Fax: 306-966-2488
Email: musangu.ngeleka@pds.usask.ca

GNWT Health and Social Services

Dr. Andre Corriveau (Office of the Chief Public Health Officer)
NWT Chief Public Health Officer
GNWT Health and Social Services
Yellowknife, NT
Phone: 867-920-6204
Email: andre_corriveau@gov.nt.ca

Melanie Kearley (anthrax vaccination and prophylaxis, public health)
Patient Services – Public Health
Fort Smith Health and Social Services Authority
Fort Smith, NT
Phone: 867-872-6203
Email: melanie_kearley@gov.nt.ca

Duane Fleming (environmental health)
Chief Environmental Health Officer
GNWT Health and Social Services
Phone: 867-873-2183
Email: duane_fleming@gov.nt.ca

Parks Canada

Stuart MacMillan
Wood Buffalo National Park
149 McDougal Road
P.O. Box 750
Fort Smith, NT X0E 0P0
Phone: 867-872-7938
Fax: 867-872-3910
Email: stuart.macmillan@pc.gc.ca

Mike Vassal (anthrax lead – WBNP north)
Resource Management Officer
Wood Buffalo National Park
149 McDougal Road
P.O. Box 750
Fort Smith, NT X0E 0P0
Phone: 867-872-7947
Fax: 867-872-3910
Email: mike.vassal@pc.gc.ca

David Campbell (anthrax lead – WBNP south)
Wood Buffalo National Park
PO Box 38
Fort Chipewyan, AB T0P1B0
Phone: 780-697-3662
Fax: 780-697-3560
Email: david.campbell@pc.gc.ca

Dr. Todd Shury
Wildlife Health Specialist
Parks Canada Agency
C/O WCVM Veterinary Pathology
52 Campus Drive
Saskatoon, SK S7N 5B4
Phone: 306-966-2930
Fax: 306-966-7439
Email: todd.shury@pc.gc.ca

Anthrax Experts

Dr. Dan Dragon (biosafety and PPE, diagnostics, spore ecology)
Biosafety Officer
Office of Environmental Health and Safety
University of Alberta
107, 11390 87 Avenue
Edmonton, AB T6G 2R5
Phone: 780-492-3142
Cell: 403-581-4054
Fax: 780-492-7790
Email: daniel.dragon@ehs.ualberta.ca

John Nishi (field response, carcass treatment)
Site 2, Box 39, Rural Route 1
Millarville, AB T0L 1K0
Phone: 403-931-2538
Cell: 403-835-8821
Fax: 403-931-2538
Email: john@nishi.ca

Dr. Martin Hugh-Jones (anthrax in general)
Environmental Studies Department
Louisiana State University
Room 2279, Energy, Coast and Environment Building
Baton Rouge, Louisiana 70803-5705 USA
Phone: 225-578-5599
Fax: 225-578-4286
Email: mehj@vetmed.lsu.edu

Behchoko Contacts

Clifford Daniels
Chief, Community Government of Behchoko
P.O. Box 68
Behchoko, NT X0E 0Y0
Phone: 867-392-6500
Fax: 867-392-6139
Email: cliffordd aniels@tlicho.com

Fort Providence Contacts

Berna Landry
Acting Chief, Chief, Deh Gah Got'ie Dene Council
P.O. Box 200
Fort Resolution NT X0E 0M0
Phone: 867-699-7000
Fax: 867-699-3134
Email: chief@dehgahgotie.org

Albert Lafferty
President, Fort Providence Métis Nation
P.O. Box 319, Lot 32 North
Fort Providence, NT X0E 0L0
Phone: 867-699-4320
Fax: 867-699-4310
Email: pvmetis@ssimicro.com

Tina Gargan
Mayor, Hamlet of Fort Providence
General Delivery
Fort Providence, NT X0E 0L0
Phone: 867-699-3441
Email: sao@fortprovidence.ca

Fort Resolution Contacts

Louis Balsillie
Chief, Deninu K'ue First Nation
Box 1899
Fort Resolution NT X0E 0M0
Phone: 867-394-4335
Fax: 867-394-5122
Email: dkfnchief@fortresolution.net

Kara King
President, Fort Resolution Métis Council
Box 1921
Fort Resolution NT X0E 0M0
Phone: 867-394-4151
Cell: 780-340-3184
Fax: 867-394-3322
Email: frmc@northwestel.net

Garry Bailey
Mayor, Hamlet of Fort Resolution
General Delivery
Fort Resolution NT X0E 0M0
Phone: 867-394-4556
Fax: 867-394-5415
Email: tausia.sao@gmail.com

Fort Smith Contacts

Brad Brake
Mayor, Town of Fort Smith
Box 147
Fort Smith NT X0E 0P0
Phone: 867-872-8400
Fax: 867-872-8601
Email: mayor.brake@fortsmith.ca

Freda Martselos
Chief, Salt River First Nation
Box 960
Fort Smith NT X0E 0P0
Phone: 867-872-2986
Fax: 867-872-3550
Email: chief@srfn195.com

Fredrick (Andrew) Wanderingspirit
Chief, Smith Landing First Nation
Box 1470
Fort Smith NT X0E 0P0
Phone: 867-872-4950 or 5056
Fax: 867-872-5154
Email: chief@slfn196.com

Ken Hudson
President, Fort Smith Métis Council
Box 1107
Fort Smith NT X0E 0P0
Phone: 867-872-2643
Fax: 867-872-5225
Email: fortsmithmetiscouncil@northwestel.net

Garry Bailey
President, Northwest Territory Métis Nation
Box 720
Fort Smith NT X0E 0P0
Phone: 867-872-2770 or 867-394-4015
Cell: 867-875-2767
Fax: 867-872-2772
Email: president.nwtmn@northwestel.net

APPENDIX 6. Anthrax Surveillance Report Form

Anthrax Reconnaissance Survey Form

Last revised: June 6, 2013

DATE	LOCATION	Survey Type	
AIRCRAFT TYPE	AIRCRAFT CALLSIGN	PILOT	
NAVIGATION	LEFT OBSERVER	RIGHT OBSERVER	
TEMPERATURE	WIND (speed, direction)	CLOUD COVER (%, type)	LIGHT CONDITIONS
TIME UP		TIME DOWN	
Altitude: *(typical 800 – 1200' AGL)*		Airspeed: *(Typical 100 – 140 knots)*	
Comments			

CHECKLIST:

GPS
Spare Batteries
Radio
Satellite Phone
Air crew manual
Maps
Datasheets
Pens/Pencils
Clipboard
Sunglasses
Binoculars
Camera
Noise-cancelling headsets
Fire Report Data Sheets

DURING SURVEY:

Tracklog ON
Record – Weather
Monitor Observers
Radio Check-ins
Flight Following

DIGITAL FILES ENTERED / SAVED AS:

PAGE _____ OF _____.

WPT	TIME	LATITUDE	LONGITUDE	SPECIES[1]	COUNT	COMMENTS (Calves, Carcasses, Illness, etc)

1: BI: Bison MO: Moose WO: Wolf OT: Other Species

APPENDIX 7. Anthrax Carcass Testing and Disposal Report Form

Anthrax Carcass Testing & Disposal Report Form
(Last updated June 24, 2013)

FIELD CARCASS ID: _____

MASTER CARCASS ID:_____
(assigned by data manager)

Metadata:

Date:	Date originally discovered (if known):	Species:
Crew Leader:	Additional Crew Members:	

Site Description: (SET GPS DATUM TO NAD83)

Location Name:	GPS Waypoint ID:	Whose GPS:
Latitude: (dd mm.mmm)	Longitude: (ddd mm.mmm)	
GPS Taken: ☐ Over Carcass ☐ Close to Carcass (clean zone) (N / S / E / W of carcass) ☐ Helicopter ☐ Fixed Wing		
Habitat Type: ☐ Clearing ☐ Wooded Area ☐ Hillside ☐ Muskeg ☐ Burned Area ☐ In/Near Stream / Pond /Lake ☐ Other:_____		

Carcass Information:

Sex: ☐ Male ☐ Female ☐ Unknown	Age Class: ☐ Calf ☐ Yearling ☐ Sub-Adult ☐ Adult ☐ Unknown
Bulls: ☐ B1 ☐ B2 ☐ B3 ☐ B4 ☐Unknown	Cows: ☐ C1 ☐ C2 ☐C3 ☐ Unknown
Decomposition: ☐ Fresh ☐ Beginning ☐ Moderate (Some maggots) ☐ Extensive (lots of fluid/Maggots) ☐ Mummified	
Bloating: ☐ None ☐ Moderate ☐ Saw-horse ☐ Sagging (post-saw-horse)	
Hair Sloughing: ☐ None ☐ Slight ☐ Moderate ☐ Heavy	Estimated Length of Time Dead (days):_____
Scavenging: ☐ None ☐ Slight ☐ Moderate ☐ Extensive ☐ Disarticulated/dispersed	Primary Species:_____
☐ Dermal swellings ☐ Foam from nose/mouth	Leakage ☐ Nose/mouth ☐ Anus ☐ Skin breaks
Live Bison Present? ☐ Yes ☐ No	Number and composition of bison in area: _____ ☐ Males Only ☐ Mixed Group

Sampling:

Field Test: ☐ Positive ☐ Negative ☐ Inconclusive ☐ Not Done
Swabs: ☐ Nasal Swab ☐ Anal Swab ☐ Blood ☐ Other:_____
Other Samples: ☐ Soil ☐ Turbinate ☐ Other:_____

Treatments:

☐ First Burn	☐ Still Burning - Restack	☐ Re-Burn	☐ Post Burn Assessment	☐ No Treatment Given

☐ Formaldehyde – Pre-Burn QTY:_____Litres @ _____%	☐ Formaldehyde – Post burn QTY:_____Litres @ _____%

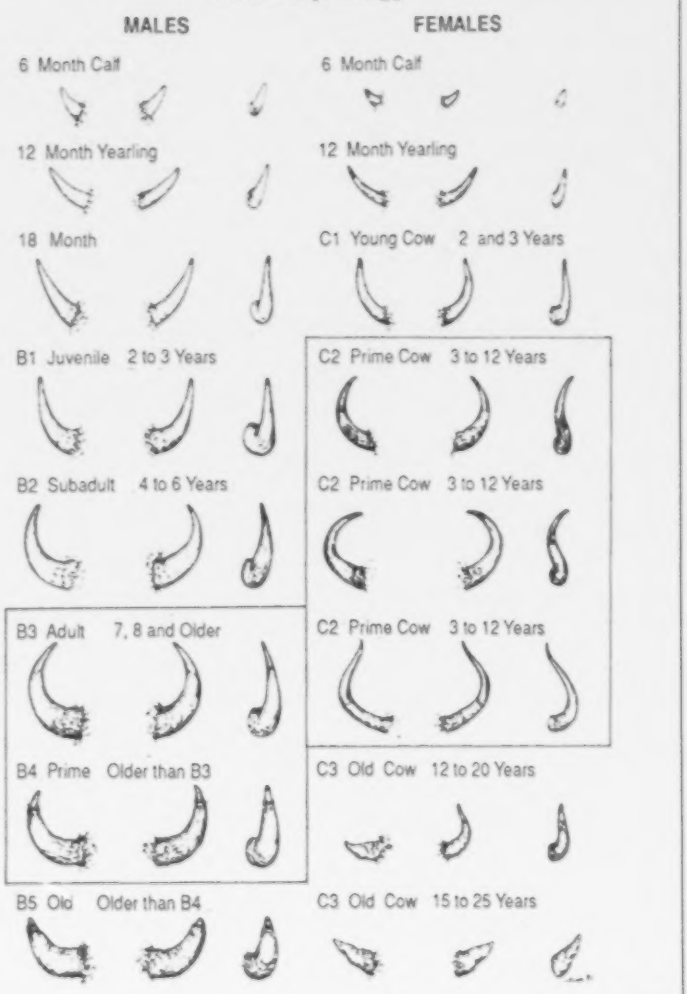
QTY Coal: ____bags @ lbs/bag	QTY Green Wood:	QTY Dry Wood:	QTY/Type Liquid Fuel: _____Litres ☐ Diesel ☐ Jet ☐ Other

Checklist:

- Assess Wildlife (bear) hazards
- Photos (Area, North, South, East, West, Head/Horns)
- GPS Waypoint – Unique Name
- All Fields Completed – in Detail
- Units given for treatment quantities
- Fire Hazard Potential (if burning)

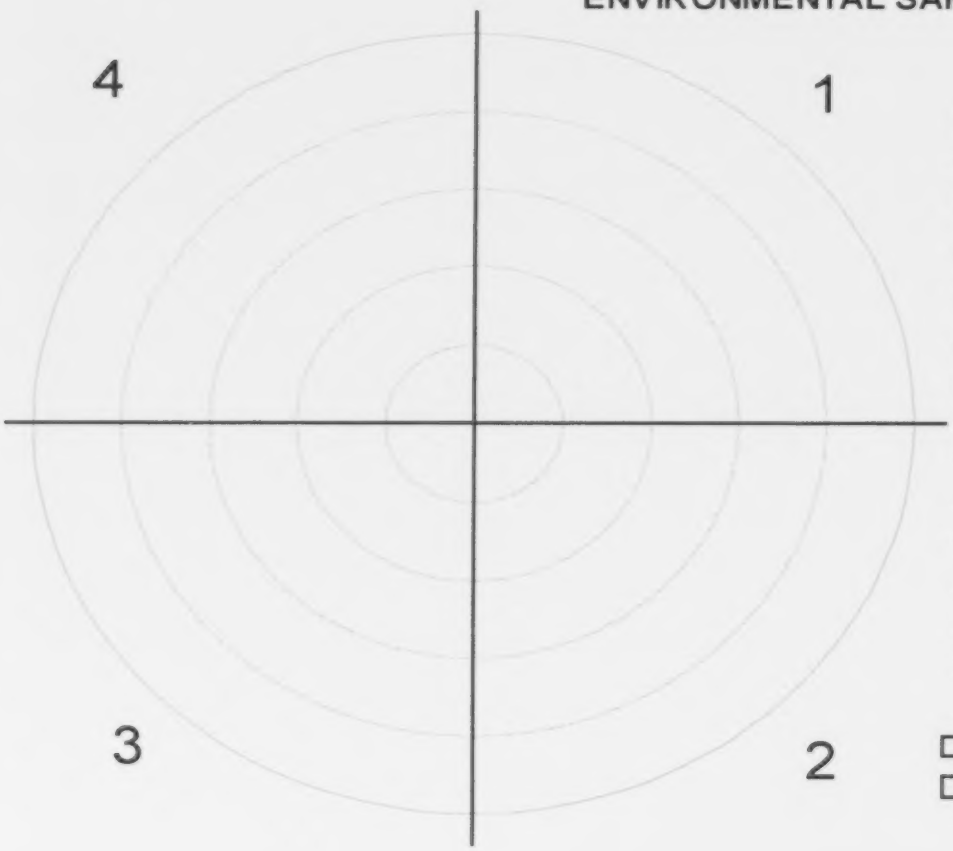
Site Sketch (if needed):

Horn Morphology


MALES
FEMALES
6 Month Calf
6 Month Calf
12 Month Yearling
12 Month Yearling
18 Month
C1 Young Cow 2 and 3 Years
B1 Juvenile 2 to 3 Years
C2 Prime Cow 3 to 12 Years
B2 Subadult 4 to 6 Years
C2 Prime Cow 3 to 12 Years
B3 Adult 7, 8 and Older
C2 Prime Cow 3 to 12 Years
B4 Prime Older than B3
C3 Old Cow 12 to 20 Years
B5 Old Older than B4
C3 Old Cow 15 to 25 Years

Additional Notes:

APPENDIX 8. Anthrax Carcass Environmental Sampling Data Sheet



ANTHRAX CARCASS SITE ENVIRONMENTAL SAMPLING DATA SHEET

Date:_____

Site ID: _____

Latitude: _____

Longitude:_____

Site Description: _____

_____

_____

_____

Sample Number:_____

_____

Comments: _____

_____

_____

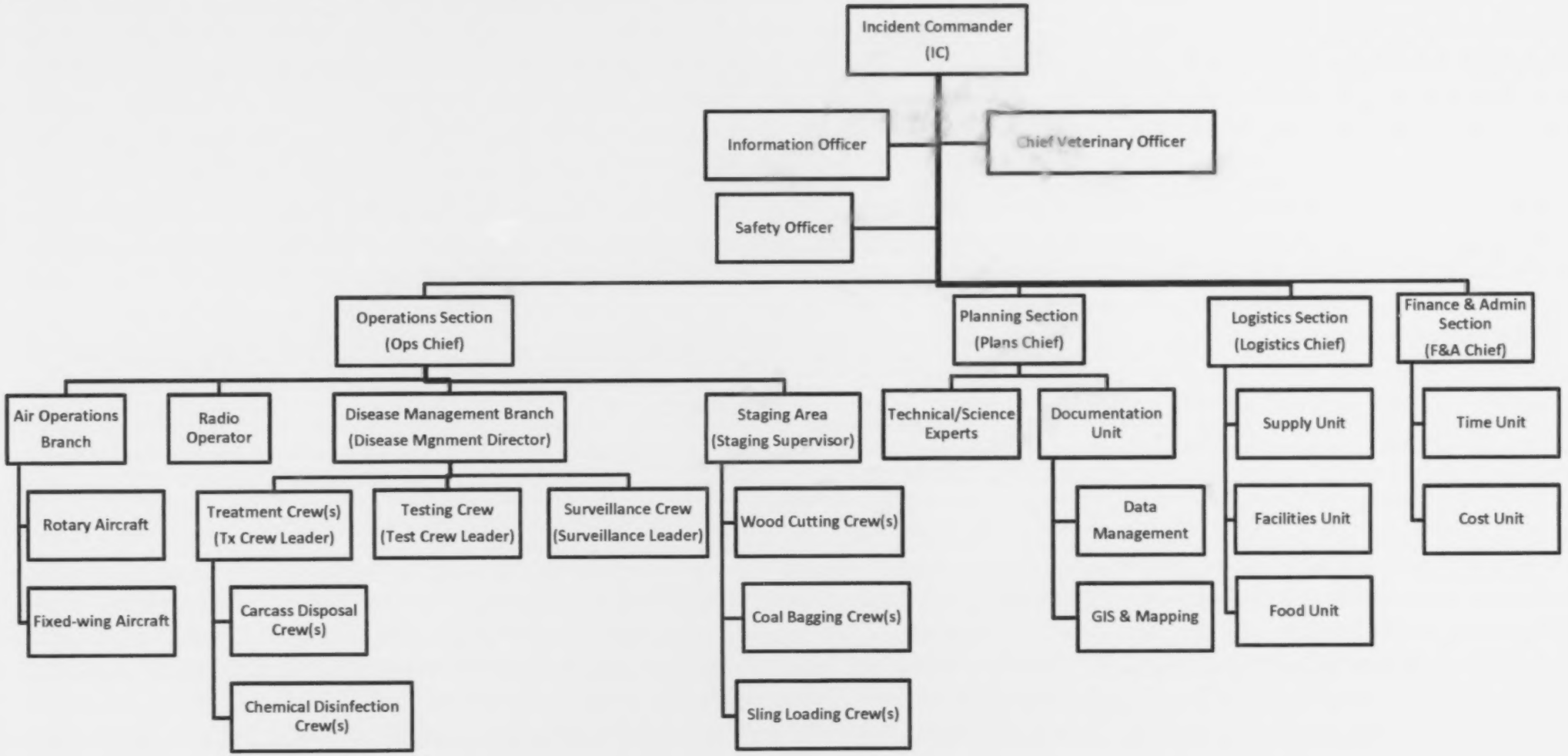
_____

_____

☐ CONTROL

☐ TREATMENT (_____)

APPENDIX 9. Anthrax Incident Command Organizational Chart



APPENDIX 10. Incident Anthrax Plan Template

Incident: *Incident Name* (*Community*)

IAP (Incident Action Plan)

For Monday 01/July/2012 – Day

SUMMARY OF CURRENT ACTIONS

For period: Sunday, June 30, 2012

Overview

On June 1, X carcasses at location Y were prepped and burned. Staging area sent out 10 loads – X pounds of coal and X dry wood. An additional 5 bison were detected at location Z, and a new carcass information form was completed for each case. Total cost to date is about $X dollars.

Consultation and Media

- No activity today.

Summary of Actions undertaken and results:

- X carcasses were prepped at area part way up the Horn Plateau.
- The surveillance crew found a 5 bison at location X. The carcasses are fresh, with no scavenging. A carcass information form was completed for each new case, including carcass information and a GPS location.
- Staging area sent out X loads (X pounds) of coal and dry wood to Location Q. More coal was bagged.

Problems/Concerns

- None.

Prepared by:	Approved by:	Date:	Time

ASSIGNMENT LIST – Disposal Teams	1. Branch	2. Division/Group
3. Incident Name ***Incident Name***	4. Operational Period Date: Monday, July 1, 2012 Time:	

5. Operations Personnel			
Operations Chief	**name**	Disposal Team Leader	**name**
Disease Control Branch Manager	**name**		

6. Resources Assigned this Period

Strike Team/Task Force/ Resource Designator	Leader	Number Persons	Trans. Needed	Drop Off PT./Time	Pick Up PT./Time
Team 1	Name				
Team 2	Name				
Team 3	Name				

7. Control Operations

Team 1 and 2: Prep and light up carcasses at location X

Team 3: Prep carcasses at location Z

8. Special Instructions

Take shotgun, 2 ¾"rifled slugs shotgun shells, satellite phone, water

Prepared by (Resource Unit Leader)	Approved by (Planning Section Chief)	Date	Time

ASSIGNMENT LIST – Surveillance Team	1. Branch	2. Division/Group
3. Incident Name ***Incident Name***	4. Operational Period Date: Monday, July 1, 2012 Time:	

5. Operations Personnel			
Operations Chief	Name		
Disease Control Branch Manager	Name		

6. Resources Assigned this Period

Strike Team/Task Force/ Resource Designator	Leader	Number Persons	Trans. Needed	Drop Off PT./Time	Pick Up PT./Time
Surveillance Team 1	name				

7. Control Operations

Conduct fixed wing surveillance flight of outbreak area and surrounding bison habitat

8. Special Instructions

Take GPS to record track logs and carcass locations

Prepared by (Resource Unit Leader)	Approved by (Planning Section Chief)	Date	Time

ASSIGNMENT LIST – Testing Team	1. Branch	2. Division/Group
3. Incident Name ***Incident Name***	4. Operational Period Date: Monday, July 1, 2012 Time:	

5. Operations Personnel			
Operations Chief	**name**		
Disease Control Branch Manager	**name**		

6. Resources Assigned this Period

Strike Team/Task Force/ Resource Designator	Leader	Number Persons	Trans. Needed	Drop Off PT./Time	Pick Up PT./Time
Testing Team 1	name				

7. Control Operations

Collect carcass information and swabs from new carcasses at site M

Conduct field anthrax test

8. Special Instructions

Prepared by (Resource Unit Leader)	Approved by (Planning Section Chief)	Date	Time

ASSIGNMENT LIST – Staging	1. ~~Branch~~	2. Division/Group
3. Incident Name ***Incident Name***	4. Operational Period Date: Monday, July 1, 2012 Time:	

5. Operations Personnel

Operations Chief	Name		

6. Resources Assigned this Period

Strike Team/Task Force/ Resource Designator	Leader	Number Persons	Trans. Needed	Drop Off PT./Time	Pick Up PT./Time
Staging crew 1	Name		Trucks		

7. Control Operations

Send coal and dry wood to location X and Y

Maintain inventory of all loads (number, date/time, fuel types and weights)

Keep on piling wood and bagging coal

8. Special Instructions

Prepared by (Resource Unit Leader)	Approved by (Planning Section Chief)	Date	Time

MOB/DEMOB

DEMOB

DATE	Position	Name	destination	Transport
Monday July 1	position	name	location	Driving

MOB

DATE	Position	Name	Destination	Transport
Monday Aug 6	position	name	location	Air

Staffing requirements:

Need	Date Required	Notes

MEDICAL PLAN	1. INCIDENT NAME	2 DATE PREPARED	3. TIME PREPARED	4. OPERATIONAL PERIOD
	Incident Name	**July 01, 2012**	***hrs***	***until updated***

5. INCIDENT MEDICAL AID STATIONS

MEDICAL AID STATIONS	LOCATION	MEDICS	
		YES	NO
Community Health Clinic	**Community, phone number**	X	

6. TRANSPORTATION

A. AMBULANCE SERVICES

NAME	ADDRESS	PHONE	PARAMEDICS	
			YES	NO

B. INCIDENT AMBULANCES

NAME	LOCATION	PARAMEDICS	
		YES	NO
Aircraft (helicopter), call sign	**Incident**		X

7. HOSPITALS

NAME	ADDRESS	TRAVEL TIME		PHONE	HELIPAD		INCINERATE CENTER	
		AIR	GRND		YES	NO	YES	NO
Stanton Hospital	**Yellowknife**	**X hrs**	**X hrs**	**1-867-669-4100**	X			X
Hay River Hospital	**Hay River**	**X hrs**	**X hrs**	**1-867-874-7100**				x

8. MEDICAL EMERGENCY PROCEDURES

A. *Initiate first aid*
B. *Notify immediate supervisor*
C. *Supervisor notify IC or OPs*
D. *IC or Ops : Relay information to NS RDO ASAP (867-920-6115p 0514c)*
E. *Arrange for transport as required*
F. *Fill out WSCC report and forward*

ALL crews to take first aid kits to field with them

Individuals working alone to carry sat phones

Each crew to carry shotguns

206 ICS 8/78	9. PREPARED BY (MEDICAL UNIT LEADER)	10. REVIEWED BY (SAFETY OFFICER)
	name	

INCIDENT COMMUNICATIONS PLAN				1. INCIDENT NAME	2. DATE/TIME PREPARED	3. OPERATIONAL PERIOD DATE/TIME
				Incident name	Monday, July 1, 2012	*Duration of incident*
RADIO						
Assigned to	**FUNCTION**	**CHANNEL**		**Simplex/Duplex**	**REMARKS**	
All	*Repeater*	*X*		*FM Duplex(repeater)*		
All	*Local simplex*	*X*		*FM Simplex*	*General use on the incident*	
*IMT**	*Town simplex*	*X*		*FM Simplex*	*For communications between IMT and support staff*	
Aircraft	*122.05*			*AM Simplex*	*Air to air*	
Other						
ENR	**Land line**	**Phone number**				
Radio Op (229)	**Land line**	**Phone number**				
OPs	**Land line**	**Phone number**				
Logistics	**Land line**	**Phone number**				
F&A	**Land line**	**Phone number**				
5. PREPARED BY						

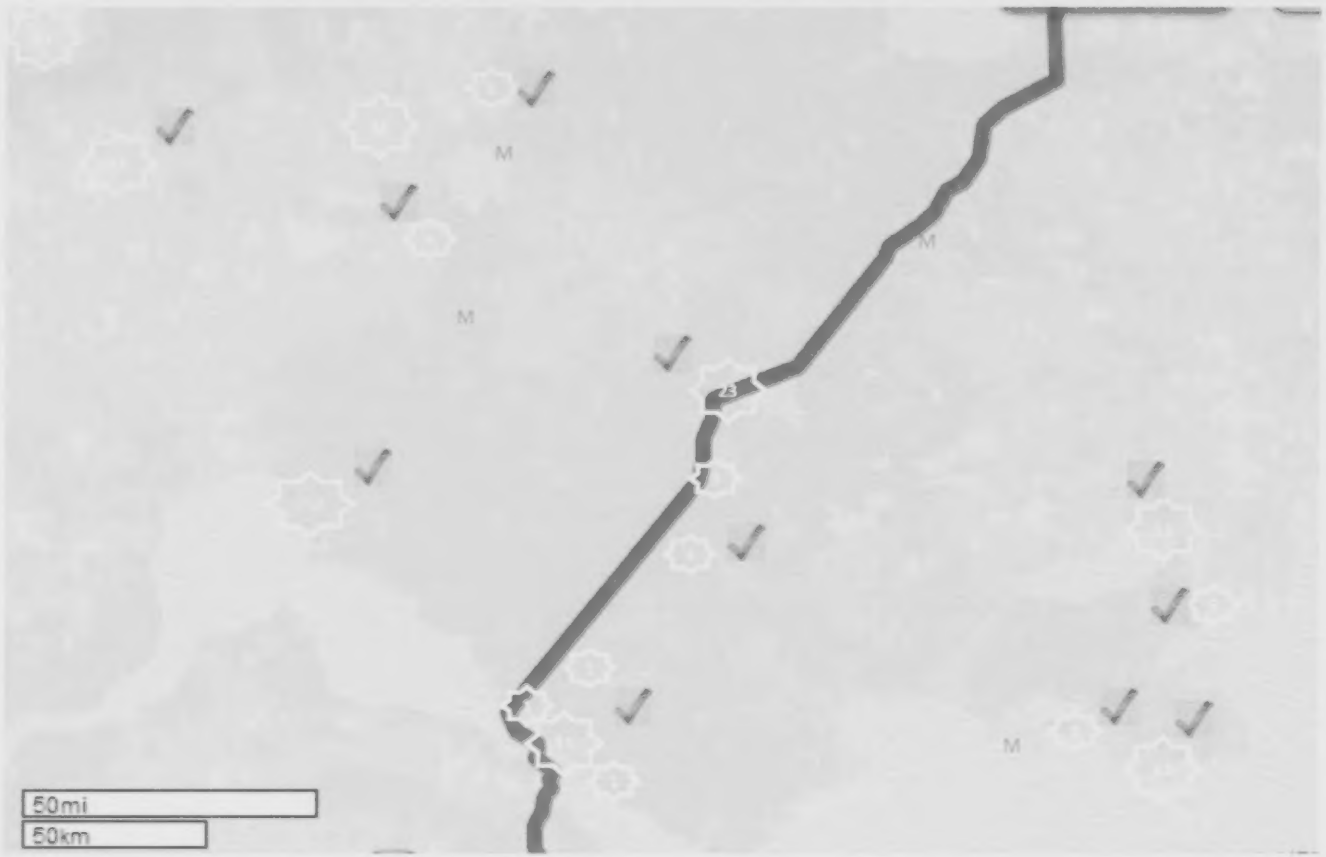
* IMT = Incident Management Team

Incident map (Incident Name)

July 1, 2012 **Anthrax Outbreak Locations** (Total carcass #))

✓ = completed (final inspection required)

M = Moose



Daily schedule

Item	Time	location	Attendees	Notes
Tactical briefing	0830	TBD	all	
Requests in to LOGISTICS	0900	TBD	n/a	
NWT WX* briefing	1030	Fire Base	IC	
Crews return	varies	---		
Daily Planning Meeting	2000	TBD	IC - CL	Debrief from day's activities and finalisation of plan for next day

* WX = Weather

APPENDIX 11. N95 Respirator On and Off Protocol

(The NWT Infection Prevention and Control Manual 2012, Appendix 5c) N95 Protocol, Page 124)

N95 Respirator On and Off Protocol

Apply mask (N95-preferably fit-tested). Seal, check to ensure good fit. Mask should move with breath. Reapply glasses.

HOW TO PROPERLY PUT ON YOUR N95 MASK

- Place the N95 mask over your nose and mouth. Make sure the metal nose clip is on top.
- Pull the bottom strap over your head until it rests at the back of your neck. If you have long hair, lift your hair to make sure the mask strap is firmly against your neck.
- Pull the top strap over your head until it rests on the crown of your head, above your ears.
- Using both hands starting at the top, mold your nose clip around your nose to achieve a secure seal.
- Tighten top and bottom straps to ensure mask is snuggly fitted.

MASK FIT CHECKS

Perform both a Positive Pressure Seal Check and a Negative Pressure Seal Check

Positive Pressure Seal Check:

- With the mask securely in place, exhale greatly.
- The mask will bulge slightly.
- If air leaks between the face and the face-seal of the mask, reposition it and readjust the nose clip for a more secure seal.

Negative Pressure Seal Check:

- With the mask securely in place, inhale greatly.
- The mask will collapse slightly.
- If air leaks between the face and the face-seal of the mask, reposition it and readjust the nose clip for a more secure seal.
- If you cannot achieve a secure seal, do not enter the contaminated area.
- Fit Testing:
- Should be done prior to deciding to wear an N95 mask, which is done by a person who is certified to do N95 fit testing
- Fit-test the N95 mask on an annual basis.

Remove mask or N95 respirator carefully.

All health care staff will be required to wear a N95 mask for airborne precautions and must undergo annual respirator fit testing. AFD testing session will provide the opportunity to obtain a N95 mask of proper size and to learn the procedure of proper donning and removing a mask.

APPENDIX 12. Suppliers for Anthrax Materials and Supplies

Personal Protective Equipment:

Tyvek® Suits, Plastic Booties, N95 Masks, Formaldehyde Rated Respirators, Latex Gloves, Hand Sanitizer:

MSS Ltd
47 Studney Drive
Hay River, NT X0E 0R6
Phone: 888-397-0886 or 867-874-6337
After Hours Phone: 867-874-3464
Fax: 800-661-0886 or 867-874-3866
Email: contact@mssltd.com
Website: www.mssltd.com/Mss40/Home.aspx

Pioneer Supply House
362 Old Airport Road
Yellowknife, NT
Phone: 867-873-3559
Fax: 867-873-3397
Email: pioneer@theedge.ca
Website: www.pioneersupply.ca/one-source-in-the-north

Canadawide Scientific Limited
2300 Walkley Road
Ottawa, ON K1G 6B1
Phone: 800-267-2362 or 613-736-8811
Fax: 800-814-5162 or 613-736-0150
Email: cwsales@canadawide.ca
Website: http://canadawide.ca/

VWR International
2103 64th Avenue
Edmonton, AB T6P 1Z4
Phone: 800-932-5000
Fax: 800-668-6348
Website: https://ca.vwr.com/

Rubber Boots, Splash Pants, Coveralls, Leather Work Gloves:

G & L Work Wear Ltd.
62 Woodland Drive Suite 106
Hay River, NT X0E 1G1
Phone: 867-874-3037
Fax: 867-874-3141

Marks Work Wearhouse
307 Old Airport Road
Yellowknife, NT
Phone: 867-669-9267
Email: pioneer@theedge.ca
Website: www.marks.com

MSS Ltd
47 Studney Drive
Hay River, NT X0E 0R6
Phone: 888-397-0886 or 867-874-6337
After hours phone: 867-874-3464
Fax: 800-661-0886 or 867-874-3866
Email: contact@mssltd.com
Website: www.mssltd.com/Mss40/Home.aspx

Pioneer Supply House
362 Old Airport Road
Yellowknife, NT
Phone: 867-873-3559
Fax: 867-873-3397
Email: pioneer@theedge.ca
Website: www.pioneersupply.ca/one-source-in-the-north

Weaver & Devore
3601 Weaver Drive
Yellowknife, NT X1A 2J5
Phone: 867-873-2219
Fax: 867-873-2219
Email: sales@weaverdevore.ca
Website: http://weaverdevore.ca/

Disease Sampling & Testing Supplies:

Swabs, Vials, Sample Jars, Disposable Scalpels, Sample Bags:

MSS Ltd
47 Studney Drive
Hay River, NT X0E 0R6
Phone: 888-397-0886 or 867-874-6337
After hours phone: 867-874-3464
Fax: 800-661-0886 or 867-874-3866
Email: contact@mssltd.com
Website: www.mssltd.com/Mss40/Home.aspx

Pioneer Supply House
362 Old Airport Road
Yellowknife, NT
Phone: 867-873-3559
Fax: 867-873-3397
Email: pioneer@theedge.ca
Website: www.pioneersupply.ca/one-source-in-the-north

Canadawide Scientific Limited
2300 Walkley Road
Ottawa, ON K1G 6B1
Phone: 800-267-2362 or 613-736-8811
Fax: 800-814-5162 or 613-736-0150
Email: cwsales@canadawide.ca
Website: http://canadawide.ca/

VWR International
2103 64th Avenue
Edmonton, AB T6P 1Z4
Phone: 800-932-5000
Fax: 800-668-6348
Website: https://ca.vwr.com/

Sample Shipment Packaging & TDG Infectious Substances On-line Training:

Saf-T-Pak Inc.
#10807 182 Street
Edmonton, AB T5S 1J5
Phone: 780-786-0211
Fax: 780-486-0235
Website: www.saftpak.com

Field Operational Supplies:

Come-alongs, Rope, Stakes, Back-pack Sprayers, Rakes, Shovels, Spray Paint:

Canadian Tire
328 Old Airport Road
Yellowknife, NT X1A 3T3
Phone: 867-873-2403
Website: http://flyer.canadiantire.ca

Freund Building Supplies
P.O. Box 220
Fort Smith, NT X0E 0P0
Phone: 867-872-2155

Home Hardware (Fort Smith)
157 McDougal Road
Fort Smith, NT X0E 0P0
Phone: 867-872-2121

Hay River Home Hardware (Hay River)
70 Industrial Drive
Hay River, NT X0E 0R6
Phone: 867-874-6722
Fax: 867-874-2266
Email: www.homehardware.ca/en/dealer-microsites/5134-4/contact-information.htm

Pioneer Supply House
362 Old Airport Road
Yellowknife, NT
Phone: 867-873-3559
Fax: 867-873-3397
Email: pioneer@theedge.ca
Website: www.pioneersupply.ca/one-source-in-the-north

True Value Hardware (Hay River)
101 62 Woodland Drive SS99
Hay River, NT X0E 1G1
Phone: 867-874-4559

Weaver & Devore
3601 Weaver Drive
Yellowknife, NT X1A 2J5
Phone: 867-873-2219
Fax: 867-873-2219
Email: sales@weaverdevore.ca
Website: http://weaverdevore.ca/

Coal:

Dodds Coal Mining Company
Riley, AB

Peter & Dayna Kudrowich
(P) 780-663-2285

Don & Paula Bowal
(P) 780-679-5702
Email: www.doddscoalmine.com/

McKinnon Coal & Firewood
5750 11th Street SE
Calgary, AB T2H 2G1
Phone: 403-243-7975

Northwest Transport (Edmonton)
Phone: 800-661-6992 ext. 264

Wood:

Patterson's Sawmill
Attn: Dan Patterson
60 Patterson Road
Hay River, NT X0E 0R4
Phone: 867-874-6814

SAND Environmental Excavating
Attn: Dave Hehn
Fort Smith, NT
Phone: 867-872-3435

Kerry's Salvage and Fire Wood
Attn: Kerry Smith
Yellowknife, NT